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DOCUMENT

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EVALUATION OF STM POWER MOSFET:

^{60}Co TID TEST RESULTS ON PART TYPE STRH8N10STF3

(N-CHANNEL 100V 8A)

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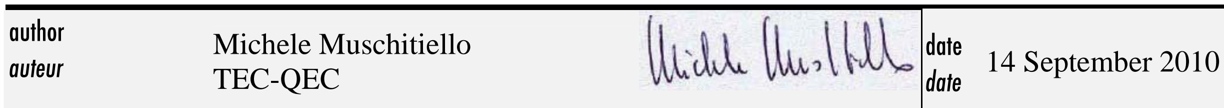

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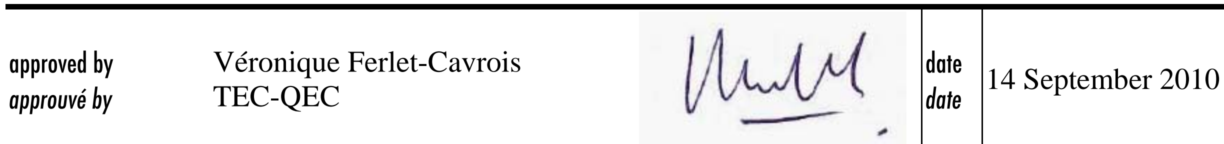

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Test Report Number	**ESA_QEC RA0557**
Project	European Component Initiative - phase I Critical Components
SCC Component no.	***n/a***
Component Designation	STRH8N10STF3
Irradiation Spec. no.	ESA/SCC 22900
Family	N-Channel Power MOSFET
Group	Silicon
Package	TO3
Component Specification	STRH8N10STF3 ***> not issued <*** *Manufacturer Test Conditions Log HGOC.tst, dated 09.09.2009 used instead of.*
Test House Name	ESA / ESTEC
Irradiation Test Plan Number	*TEST PLAN FOR TID EVALUATION STM POWER MOSFETS (draft status), rev.D 31.07.2009*
Manufacturer name	STM
Application type of Acceptance	n/a
Date Code (diffusion lot)	Diffusion Lot nr. 3844738
Serial Number of samples	001, 002, 003, 004, 005, 006, 007, 008, 009, 010, 011, 012, 013, 014, 015, 016, 017, 018, 019, [034 reference device]
Irradiation Measurement schedule: Bias conditions: Circuit Reference: Temp °C: Duration:	0, 6, 15, 22.5, 30, 55, 70, 110 krad(Si) Total Dose ***BC1*** - s/n's 013, 014, 015, 016, 017: V_{DS} = 0V, V_{GS} = +15V ***BC2*** - s/n's 008, 009, 010, 011, 012: V_{DS} = +80V, V_{GS} = 0V ***BC3*** - s/n's 001, 002, 003, 004, 005: V_{DS} = 0V, V_{GS} = 0V ***BC4*** - s/n's 006, 007: V_{DS} = +100V, V_{GS} = -20V ***BC5*** - s/n's 018, 019: V_{DS} = 0V, V_{GS} = +12V Fig.1 Room temperature 20 ± 5 300 hours
Electrical Measurement Parameters:	I_{GSS_F1}, I_{GSS_R1} I_{DSS} @ Vds 5V, Vgs 0V, I_{DSS} @ Vds 80V, Vgs 0V , I_{DSS} @ Vds 100V, Vgs 0V V_{GS_th} @ Id 0.01 mA, V_{GS_th} @ Id 0.10 mA, V_{GS_th} @ Id 0.25 mA, V_{GS_th} @ Id 1.00 mA $V_{(BR)DSS}$ @Id=100uA, $V_{(BR)DSS}$ @Id=250uA, $V_{(BR)DSS}$ @Id=1mA R_{DS}(on) – Drain Source On-Resistance V_{SD} - Inverse Diode Fwd. Volt. V_{DS}(on) – Drain Source On-Voltage, $I_{D(on)}$ - On-State Drain Current. Gate Charge Qg, Qgs, Qgd
Facility Source: Energy: Dose Rate:	ESA/ESTEC ^{60}Co (gamma) 1.173 MeV 1.332 MeV 5.9 rad(Si)/min

Absorbing Material: Thickness: Temperature ^{o}C:	N/A N/A 20 ± 3
Dosimetry / Calibration method.	Calibrated NE2571, 0.6cc air ionisation chamber s/n 3112 Calibrated Farmer 2670 dosimeter s/n 109.
Annealing / Ageing Biasing conditions Bias Circuit Reference	6 hours at Room Temperature 21 hours at Room Temperature 140 hours at Room Temperature 168 hours at 100 °C ***BC1*** - s/n's 013, 014, 015, 016, 017: V_{DS} = 0V, V_{GS} = +15V ***BC2*** - s/n's 008, 009, 010, 011, 012: V_{DS} = +80V, V_{GS} = 0V ***BC3*** - s/n's 001, 002, 003, 004, 005: V_{DS} = 0V, V_{GS} = 0V ***BC4*** - s/n's 006, 007: V_{DS} = +100V, V_{GS} = -20V ***BC5*** - s/n's 018, 019: V_{DS} = 0V, V_{GS} = +12V Fig.1

1 INTRODUCTION

The following document contains the conditions and the results of the total dose test campaign for the evaluation of the radiation tolerance of the discrete N-Channel PowerMOS, based on type STRH8N10STF3, manufactured by STM.
This test was conducted on prototypes from diffusion lot number 3844738, packaged in TO3, provided by the manufacturer.

2 APPLICABLE DOCUMENTS

AD 1. ESA-ESTEC QEC document: TEST PLAN FOR TID EVALUATION STM POWER MOSFETS (draft status), rev.D 31.07.2009.
AD 2. ESA/SCC 22900 “Total Dose Steady-State Irradiation Test Method”, issue 3.
AD 3. Qualification program of N. And P. channel Rad-Hard Power Mosfets, STMicrolectronics RNS/PB/0907101ce Rev.03, March 12th 2009
AD 4. Manufacturer Test Conditions Log HGOC.tst, dated 09.09.2009
AD 5. ESCC Generic Specification 5000, Issue 5 July 2009

3 TEST DESCRIPTION

Thirty six devices, POWER MOSFET based on type STRH8N10STF3, manufactured by STM have been received for TID testing at the ESTEC ^{60}Co facility. All the devices have been electrically tested (go/no go) and the serialised as shown in Table 1.

According to the Evaluation Test Plan [AD 1], nineteen devices have been irradiated. Table 1 summarise the information on test sample.

Table 1 received samples and their usage.

S/n's	Description
001-005	Unbiased during ^{60}Co irradiation (Bias Condition **BC3**)
006-007	Biased during ^{60}Co irradiation (V_{DS} = +100V, V_{GS} = -20V, Bias Condition **BC4**)
008-012	Biased during ^{60}Co irradiation (V_{DS} = + 80V, V_{GS} = 0V, Bias Condition **BC2**)
013-017	Biased during ^{60}Co irradiation (V_{DS} = 0V, V_{GS} = +15V, Bias Condition **BC1**)
018-019	Biased during ^{60}Co irradiation (V_{DS} = 0V, V_{GS} = +12V, Bias Condition **BC5**)
34	Reference device (not irradiated) - Electrically tested before and after each intermediate measurement run at irradiation step completion
35	Used for Gate Charge Measurement Set-up (not Irradiated).
020-033, 036	Passed initial go/no go electrical measurements. Not Irradiated

Refer to TID Evaluation test plan [AD 1] for more details on test conditions.

4 RADIATION TEST PLAN

The actual radiation test steps are reported in Table 2.

Table 2 Irradiation Test Plan

Step	Total Dose (Si) krad	Dose Rate (Si)rad/min
(Pre irradiation) 0	==	==
Irradiation step # 1	6.20	5.44
Irradiation step # 2	15.00	5.52
Irradiation step # 3	22.50	5.65
Irradiation step # 4	30.06	5.70
Irradiation step # 5	55.00	5.81
Irradiation step # 6	70.07	5.77
Irradiation step # 7	110.50	5.81

At the completion of each irradiation step, intermediate electrical measurements were carried out according to the next paragraph. Fig.1 shows the bias circuits used during the irradiation.

At the end of the final irradiation run, all devices were electrically measured and annealed at room temperature (for 167 hours in total) and subsequently aged at 100°C (168 hrs), maintaining the same bias conditions applied during the TID test.
Table 3 reports the annealing/ageing sequence detail.

Table 3 Anneal/ageing sequence

Step	Temperature	Duration
Anneal	Room temperature	6 hours
Anneal	Room temperature	21 hours
Anneal	Room temperature	140 hours
Ageing	100 °C	168 hours

At the completion of each anneal/ageing step, all devices were electrically tested.

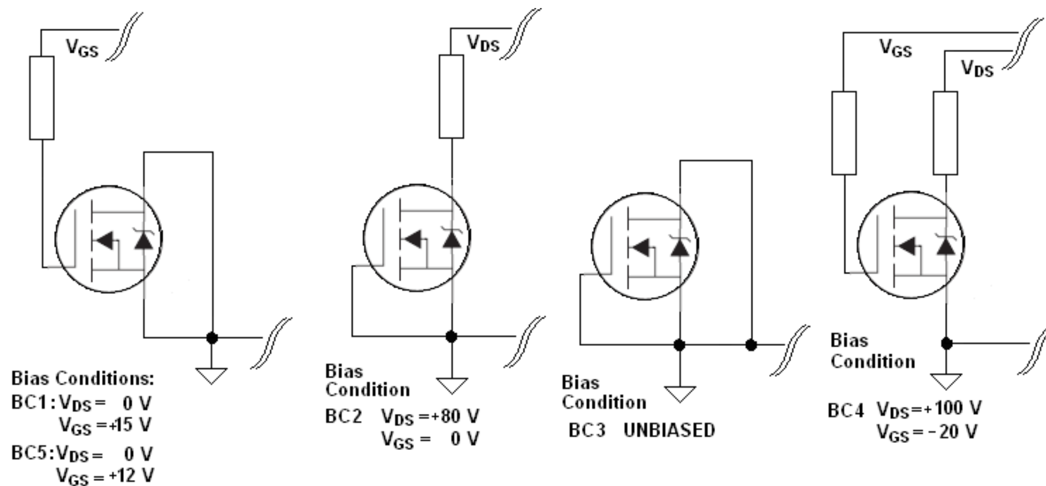


Fig.1 Radiation Test Biasing circuits.

4.1 Measurement set-up

No In-situ measurements were performed during irradiation. The measured parameters, the test conditions and the adopted Min-Max limits (pass/fail criteria) are listed in Table 4.

Table 4 Measured Parameters, Min-Max Limits and Test conditions

<table>
<tr><th rowspan="2">nr.</th><th rowspan="2">Parameter</th><th rowspan="2">Note</th><th colspan="2">Limits</th><th rowspan="2">Unit</th><th rowspan="2">Mil-Std-750 test method</th><th rowspan="2">Test conditions</th></tr>
<tr><th>Min.</th><th>Max.</th></tr>
<tr><td>0</td><td>IGSS_F1</td><td>Gate Leakage Current (fwd)</td><td></td><td>100</td><td>nA</td><td>3411</td><td>V_{GS} = +20V</td></tr>
<tr><td>1</td><td>IGSS_R1</td><td>Gate Leakage Current (rev.)</td><td></td><td>100</td><td>nA</td><td>3411</td><td>V_{GS} = -20V</td></tr>
<tr><td>(a)(d) 2</td><td>IDSS @ Vds 5V, Vgs 0V</td><td rowspan="3">Drain Current (off state)</td><td></td><td>10</td><td>µA</td><td>3413</td><td>V_{DS} = 5V
V_{GS} = 0V</td></tr>
<tr><td>(a)(d) 3</td><td>IDSS @ Vds 80V, Vgs 0V</td><td></td><td>10</td><td>µA</td><td>3413</td><td>V_{DS} = 80V
V_{GS} = 0V</td></tr>
<tr><td>(b)4</td><td>IDSS @ Vds 100V, Vgs 0V</td><td></td><td>10</td><td>µA</td><td>3413</td><td>V_{DS} = 100V
V_{GS} = 0V</td></tr>
<tr><td>(a)(d) 5</td><td>VGS_th @ I_D 0.01 mA</td><td rowspan="4">Gate threshold voltage</td><td>2000</td><td>4500</td><td>mV</td><td>3403</td><td>V_{DS} = V_{GS}
I_D = 0.01mA</td></tr>
<tr><td>(a)(d) 6</td><td>VGS_th @ I_D 0.10 mA</td><td>2000</td><td>4500</td><td>mV</td><td>3403</td><td>V_{DS} = V_{GS}
I_D = 0.1mA</td></tr>
<tr><td>7</td><td>VGS_th @ I_D 0.25 mA</td><td>2000</td><td>4500</td><td>mV</td><td>3403</td><td>V_{DS} = V_{GS}
I_D = 0.25mA</td></tr>
<tr><td>8</td><td>VGS_th @ I_D 1.00 mA</td><td>2000</td><td>4500</td><td>mV</td><td>3403</td><td>V_{DS} = V_{GS}
I_D = 1mA</td></tr>
<tr><td>(a)(d) 9</td><td>RDS(on) - D-S On-Resistance</td><td>Drain-Source On resistance</td><td></td><td>n.d.</td><td>Ohm</td><td>3421</td><td>V_{GS} = 10V
I_{DS} = 4A</td></tr>
<tr><td>(c) 10</td><td>VDS(on) - D-S On-Voltage</td><td>Drain-Source On voltage</td><td></td><td>800</td><td>mV</td><td>3405</td><td>V_{GS} = 10V
I_{DS} = 4A</td></tr>
<tr><td>(a)(d) 11</td><td>V(BR)DSS @I_D=100uA</td><td rowspan="3">V_{DS} Breakdown</td><td>100</td><td></td><td>V</td><td>3407</td><td>V_{GS} = 0V
I_{DS} = 100uA</td></tr>
<tr><td>12</td><td>V(BR)DSS @I_D=250uA</td><td>100</td><td></td><td>V</td><td>3407</td><td>V_{GS} = 0V
I_{DS} = 250uA</td></tr>
<tr><td>13</td><td>V(BR)DSS @I_D=1mA</td><td>100</td><td></td><td>V</td><td>3407</td><td>V_{GS} = 0V
I_{DS} = 1mA</td></tr>
<tr><td>(a)(d) 14</td><td>VSD - Inverse Diode Fwd. Volt.</td><td>Fwd voltage inverse diode</td><td></td><td>1200</td><td>mV</td><td>4011</td><td>I_{SD} = 8A
V_{GS} = 0V</td></tr>
<tr><td>(a)(d) 15</td><td>ID(on) - On-State Drain Current</td><td>Drain-Source max On current</td><td>8</td><td></td><td>A</td><td>3413</td><td>V_{GS} = 10V
V_{DS} = 10V</td></tr>
<tr><td>(a)(d) 16</td><td>Q_G Total Gate Charge</td><td rowspan="3">Gate Charge switch-on characteristics</td><td>n.d.</td><td>n.d.</td><td>nC</td><td rowspan="3">3471</td><td rowspan="3">I_G = 0.2 mA,
V_{GS} = 12 V
V_{DS}= 50V,
I_{DS} = 4A</td></tr>
<tr><td>(a)(d) 17</td><td>Q_{GS} Gate – Source Charge</td><td>n.d.</td><td>n.d.</td><td>nC</td></tr>
<tr><td>(a)(d) 18</td><td>Q_{GD} Gate – Drain Charge</td><td>n.d.</td><td>n.d.</td><td>nC</td></tr>
</table>

(a) Parameter not listed in Manufacturer Test Condition Log HGOC.tst, dated 09.09.2009.
(b) Maximum limit of 10µA instead of 1 mA has been adopted to enhance ATE accuracy for the parameter measurement.
(c) The actual test conditions deviate from Manufacturer Test Condition Log HGOC.tst, dated 09.09.2009 due to test equipment limitation.
(d) Test conditions and Min-Max limits not defined in Manufacturer Test Condition Log HGOC.tst, dated 09.09.2009

Parameters from nr.0 to nr.15 have been measured by using Unimet M3000 Automatic Test Equipment.

Parameters from nr.16 to nr.18 (Gate Charge) have been measured according to the test set-up schematized in Figure 2. More details are reported in paragraph 4.4.2 *GATE CHARGE WAVEFORMS*.

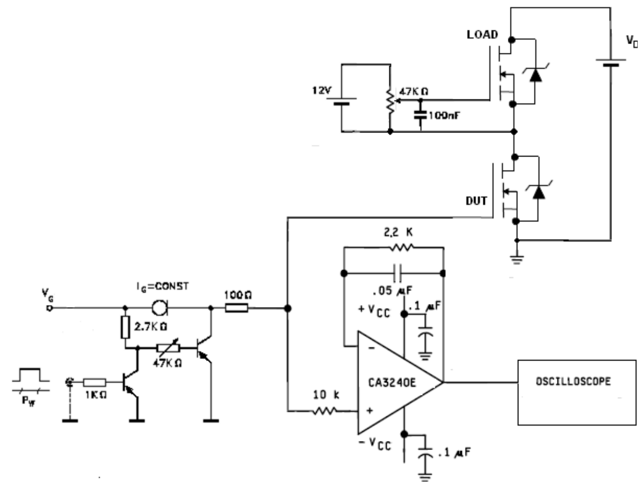


Figure 2 Gate Charge measurement circuit.

4.2 Thermal conditions

All irradiations and measurements were performed at room temperature (20 ± 3 ^{o}C). The environmental conditions were continuously monitored.

4.3 Dosimetry

Calibrated NE2571, 0.6cc air ionisation s/n 3112 chamber, read by calibrated Farmer 2670 s/n 109 dosimeter was used to measure the Total Ionising Dose.

4.4 Test Results

All measurement results are reported from Table 5 to Table 23. Test ended with a registered Total Dose of 110.5 krad(Si). At the end of the last irradiation step, electrical measurements were performed and the devices were tested again after 6, 21 and 140 hours annealing at room temperature. During the entire annealing, the irradiated devices were biased employing the same test board.
After the annealing, the samples went through accelerated ageing for 168 hrs at 100°C under the same bias conditions.

Following the accelerated ageing test, full parametric measurements were performed.

Electrical Measurement uncertainty values, reported in table footnotes, were estimated by observing the variations in the reference device (s/n 34) parameters, during the entire test campaign. Uncertainty has been calculated by using [1] below, with a coverage factor of 3.

[1] $$u = \frac{s}{\sqrt{n}},$$

u = estimated overall uncertainty
s = standard deviation
n= number of observations

Significant data from tables have been plotted from Table 5 to Figure 21. Data, taken during and after the annealing/ageing sequence, have been plotted on the same graph with a gap between the TID X axis scale and the annealing/ageing time scale (arbitrarily set).

Details on the extracted gate charge parameters are reported in paragraph 4.4.2 *GATE CHARGE WAVEFORMS*.

4.4.1 Electrical Measurement Data

Table 5 – I_{GSS_F1} Gate Leakage Current (fwd) [nA] vs ^{60}Co Irradiation Total Dose [rad (Si)]

STRH8N10STF3	Min.	Max.	Unit
Applicable limits:		100.0	[nA]

Detailed results - Measurement data in [nA]

s/n	0	6'197	15'000	22'500	30'062	55'000	70'067	110'500	Annealing 6hrs RT	Annealing 21hrs RT	Annealing 139hrs RT	Ageing 168hrs 100'C	Applied Bias Condition
001	0.017	0.070	0.011	0.011	0.061	0.013	0.082	0.135	0.046	0.017	0.033	0.066	(V_{DS} 0V, V_{GS} 0V)
002	0.019	0.005	0.048	0.071	0.017	0.021	0.057	0.046	0.047	0.090	0.029	0.119	(V_{DS} 0V, V_{GS} 0V)
003	0.073	0.133	0.053	0.058	0.030	0.052	0.060	0.081	0.025	0.033	0.101	0.054	(V_{DS} 0V, V_{GS} 0V)
004	0.059	0.018	0.048	0.098	0.064	0.095	0.092	0.106	0.028	0.097	0.085	0.050	(V_{DS} 0V, V_{GS} 0V)
005	0.061	0.011	0.003	0.068	0.046	0.005	0.118	0.074	0.067	0.002	0.059	0.004	(V_{DS} 0V, V_{GS} 0V)
006	0.040	0.033	0.073	0.021	0.016	0.033	0.011	0.031	0.007	0.037	0.070	0.007	(V_{DS} +100V, V_{GS} -20V)
007	0.011	0.111	0.096	0.123	0.023	0.024	0.090	0.048	0.079	0.031	0.057	0.055	(V_{DS} +100V, V_{GS} -20V)
008	0.041	0.062	0.014	0.050	0.033	0.152	0.010	0.022	0.055	0.110	0.068	0.054	(V_{DS} +80V, V_{GS} 0V)
009	0.068	0.028	0.014	0.042	0.112	0.009	0.058	0.029	0.033	0.158	0.110	0.035	(V_{DS} +80V, V_{GS} 0V)
010	0.014	0.006	0.049	0.011	0.006	0.122	0.124	0.189	0.034	0.059	0.040	0.066	(V_{DS} +80V, V_{GS} 0V)
011	0.052	0.012	0.053	0.051	0.055	0.002	0.001	0.144	0.018	0.145	0.105	0.007	(V_{DS} +80V, V_{GS} 0V)
012	0.032	0.102	0.009	0.051	0.043	0.008	0.059	0.023	0.026	0.025	0.083	0.039	(V_{DS} +80V, V_{GS} 0V)
013	0.083	0.035	0.086	0.075	0.010	0.091	0.013	0.005	0.101	0.010	0.074	0.082	(V_{DS} 0V, V_{GS} +15V)
014	0.022	0.119	0.002	0.050	0.048	0.088	0.053	0.082	0.101	0.081	0.111	0.052	(V_{DS} 0V, V_{GS} +15V)
015	0.035	0.090	0.075	0.056	0.025	0.118	0.016	0.148	0.034	0.082	0.020	0.007	(V_{DS} 0V, V_{GS} +15V)
016	0.024	0.076	0.076	0.070	0.090	0.072	0.052	0.107	0.035	0.094	0.060	0.045	(V_{DS} 0V, V_{GS} +15V)
017	0.010	0.001	0.012	0.031	0.032	0.048	0.056	0.099	0.045	0.012	0.131	0.019	(V_{DS} 0V, V_{GS} +15V)
018	0.064	0.019	0.100	0.044	0.027	0.105	0.028	0.008	0.032	0.089	0.135	0.044	(V_{DS} 0V, V_{GS} +12V)
019	0.103	0.045	0.007	0.041	0.028	0.021	0.014	0.028	0.008	0.032	0.003	0.080	(V_{DS} 0V, V_{GS} +12V)
034	0.011	0.195	0.020	0.076	0.010	0.120	0.001	0.461	0.217	0.285	0.008	0.103	Reference device

Reference device **Mean value:** 0.13 **Estimated uncertainty:** ± 97.44 % (± 0.123 nA)

Red values: greater than max limit
Dark red Values: lower than min limits

STRH8N10STF3 Applicable limits:	Min.	Max.	Unit
		100.0	[nA]

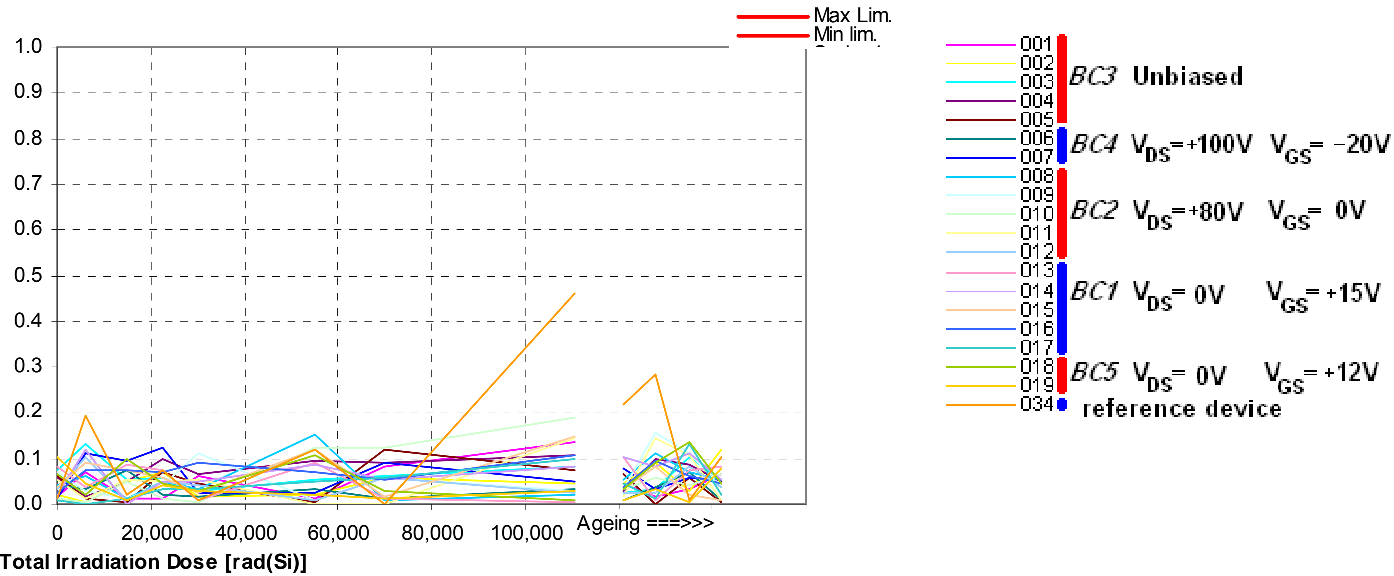


Figure 3 Data from Table 5

Table 6 – I_{GSS_R1} Gate Leakage Current (rev) [nA] vs ^{60}Co Irradiation Total Dose [rad (Si)]

STRH8N10STF3 Applicable limits:	Min.	Max.	Unit
		100.0	[nA]

Detailed results - Measurement data in [nA]

s/n	0	6'197	15'000	22'500	30'062	55'000	70'067	110'500	Annealing 6hrs RT	Annealing 21hrs RT	Annealing 139hrs RT	Ageing 168hrs 100'C	Applied Bias Condition
001	0.006	0.043	0.024	0.056	0.062	0.025	0.019	0.032	0.005	0.018	0.038	0.034	(V_{DS} 0V, V_{GS} 0V)
002	0.039	0.001	0.036	0.080	0.025	0.016	0.068	0.009	0.027	0.005	0.052	0.042	(V_{DS} 0V, V_{GS} 0V)
003	0.023	0.039	0.080	0.059	0.069	0.041	0.101	0.003	0.009	0.042	0.020	0.027	(V_{DS} 0V, V_{GS} 0V)
004	0.036	0.010	0.036	0.045	0.049	0.058	0.043	0.010	0.007	0.004	0.050	0.025	(V_{DS} 0V, V_{GS} 0V)
005	0.022	0.059	0.021	0.033	0.047	0.019	0.012	0.042	0.041	0.009	0.067	0.001	(V_{DS} 0V, V_{GS} 0V)
006	0.054	0.051	0.033	0.045	0.015	0.038	0.002	0.040	0.047	0.049	0.013	0.062	(V_{DS} +100V, V_{GS} -20V)
007	0.051	0.021	0.023	0.065	0.023	0.058	0.047	0.013	0.053	0.009	0.073	0.006	(V_{DS} +100V, V_{GS} -20V)
008	0.025	0.018	0.074	0.059	0.044	0.075	0.032	0.035	0.005	0.032	0.026	0.053	(V_{DS} +80V, V_{GS} 0V)
009	0.006	0.013	0.123	0.629	0.018	0.063	0.008	0.046	0.002	0.064	0.006	0.073	(V_{DS} +80V, V_{GS} 0V)
010	0.029	0.021	0.027	0.007	0.027	0.049	0.032	0.014	0.063	0.154	0.062	0.034	(V_{DS} +80V, V_{GS} 0V)
011	0.018	0.059	0.080	0.114	0.040	0.017	0.088	0.049	0.053	0.006	0.012	0.029	(V_{DS} +80V, V_{GS} 0V)
012	0.044	0.053	0.042	0.019	0.033	0.006	0.079	0.008	0.006	0.047	0.066	0.044	(V_{DS} +80V, V_{GS} 0V)
013	0.038	0.018	0.070	0.035	0.011	0.004	0.030	0.049	0.057	0.003	0.064	0.059	(V_{DS} 0V, V_{GS} +15V)
014	0.055	0.022	0.075	0.112	0.036	0.031	0.065	0.048	0.046	0.015	0.051	0.004	(V_{DS} 0V, V_{GS} +15V)
015	0.056	0.034	0.003	0.011	0.007	0.025	0.100	0.016	0.024	0.078	0.005	0.006	(V_{DS} 0V, V_{GS} +15V)
016	0.030	0.025	0.048	0.016	0.041	0.033	0.020	0.043	0.044	0.026	0.067	0.058	(V_{DS} 0V, V_{GS} +15V)
017	0.067	0.021	0.042	0.060	0.042	0.010	0.038	0.041	0.054	0.027	0.037	0.021	(V_{DS} 0V, V_{GS} +15V)
018	0.038	0.048	0.098	0.045	0.027	0.051	0.095	0.004	0.033	0.007	0.046	0.027	(V_{DS} 0V, V_{GS} +12V)
019	0.005	0.004	0.043	0.046	0.002	0.013	0.100	0.084	0.063	0.011	0.037	0.067	(V_{DS} 0V, V_{GS} +12V)
034	0.056	0.075	0.102	0.114	0.003	0.066	0.040	0.222	0.107	0.031	0.064	0.031	Reference device

Reference device **Mean value:** 0.076 **Estimated uncertainty:** ± 64.93 % (± 0.05 nA)

Red values: greater than max limit
Dark red Values: lower than min limits

STRH8N10STF3	Min.	Max.	Unit
Applicable limits:		100.0	[nA]

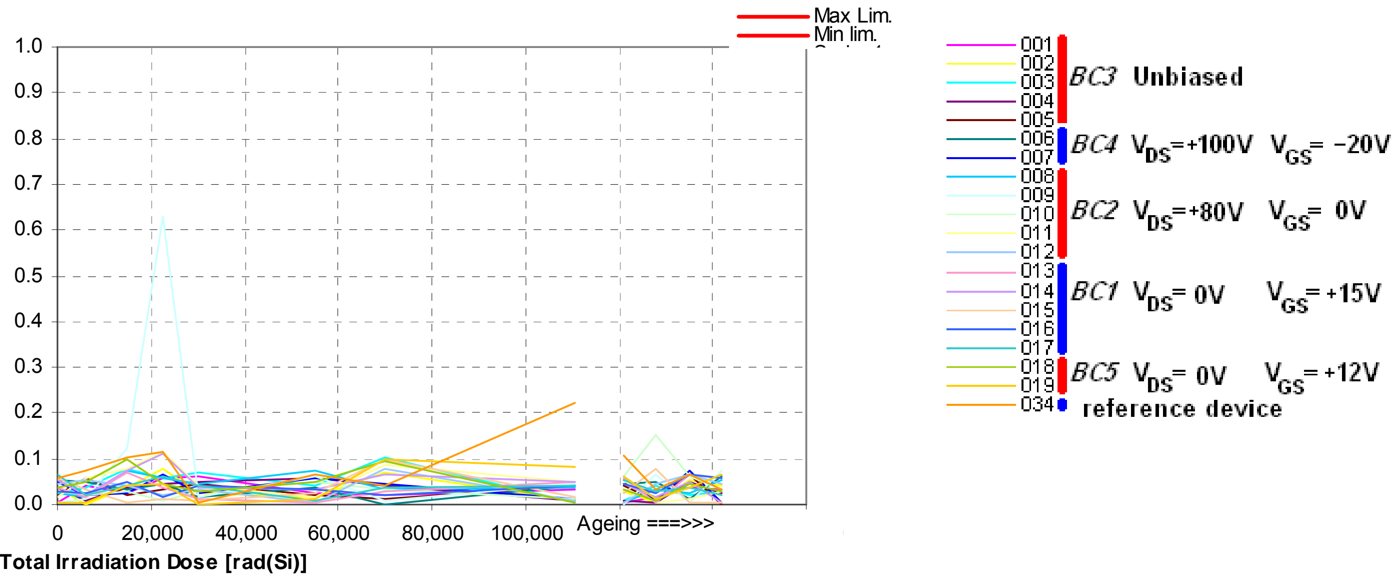


Figure 4 Data from Table 6

Table 7 – I_{DSS} @ V_{DS} 5V, V_{GS} 0V, Drain Current (off state) [nA] vs ^{60}Co Irradiation Total Dose [rad (Si)]

STRH8N10STF3	Min.	Max.	Unit
Applicable limits:		10'000	[nA]

Detailed results - Measurement data in [nA]

s/n	0	6'197	15'000	22'500	30'062	55'000	70'067	110'500	Annealing 6hrs RT	Annealing 21hrs RT	Annealing 139hrs RT	Ageing 168hrs 100'C	Applied Bias Condition
001	0.03	1.55	3.64	7.60	9.26	17.40	26.65	37.79	29.92	32.51	28.31	9.04	(V_{DS} 0V, V_{GS} 0V)
002	0.06	1.48	3.75	7.83	9.77	18.37	27.19	41.37	30.68	32.63	29.98	8.71	(V_{DS} 0V, V_{GS} 0V)
003	0.01	1.57	3.57	7.91	9.73	18.84	27.33	38.31	30.51	32.39	29.77	8.76	(V_{DS} 0V, V_{GS} 0V)
004	0.02	1.40	3.24	7.51	9.48	16.77	27.01	38.63	29.44	32.12	29.27	8.77	(V_{DS} 0V, V_{GS} 0V)
005	0.02	1.38	3.53	7.65	9.84	16.63	26.87	36.79	30.14	34.05	30.66	8.59	(V_{DS} 0V, V_{GS} 0V)
006	0.02	0.40	0.79	1.73	2.17	3.78	5.76	8.04	6.67	6.56	7.11	4.68	(V_{DS} +100V, V_{GS} -20V)
007	0.03	0.39	0.88	1.69	2.26	3.98	6.07	8.43	6.98	7.27	6.81	4.60	(V_{DS} +100V, V_{GS} -20V)
008	0.03	0.56	1.03	2.50	3.08	6.15	8.73	11.71	10.15	9.23	9.35	2.08	(V_{DS} +80V, V_{GS} 0V)
009	0.00	0.53	1.03	2.40	2.91	5.91	8.17	10.67	9.85	8.98	8.77	2.04	(V_{DS} +80V, V_{GS} 0V)
010	0.00	0.49	1.18	2.40	2.83	5.51	7.78	10.60	9.51	8.84	8.49	2.12	(V_{DS} +80V, V_{GS} 0V)
011	0.02	0.50	0.92	2.19	2.78	5.02	7.61	10.14	9.11	8.35	8.30	2.05	(V_{DS} +80V, V_{GS} 0V)
012	0.01	0.44	1.21	2.51	2.69	5.05	7.67	10.04	9.12	8.57	8.69	1.97	(V_{DS} +80V, V_{GS} 0V)
013	0.02	4.33	5.82	8.07	8.26	14.98	21.43	48.71	43.16	38.77	34.37	43.32	(V_{DS} 0V, V_{GS} +15V)
014	0.02	4.47	5.73	8.26	8.36	14.45	21.70	59.95	46.12	39.57	35.00	44.00	(V_{DS} 0V, V_{GS} +15V)
015	0.01	4.47	5.51	7.84	8.14	13.80	21.68	66.97	55.43	45.09	36.81	42.07	(V_{DS} 0V, V_{GS} +15V)
016	0.03	4.65	5.73	8.46	8.40	14.85	22.05	58.01	45.68	40.28	36.01	43.12	(V_{DS} 0V, V_{GS} +15V)
017	0.02	4.10	4.96	7.25	7.51	12.88	20.47	63.98	51.70	42.30	36.55	41.33	(V_{DS} 0V, V_{GS} +15V)
018	0.05	4.39	5.74	7.96	8.15	13.63	24.77	135.25	103.82	79.16	49.29	41.88	(V_{DS} 0V, V_{GS} +12V)
019	0.01	3.92	5.11	7.18	7.57	12.27	23.37	178.89	123.88	91.51	53.81	40.29	(V_{DS} 0V, V_{GS} +12V)
034	0.02	0.04	0.01	0.00	0.02	0.03	0.01	0.11	0.00	0.01	0.04	0.04	Reference device

Reference device **Mean value:** **0.028** **Estimated uncertainty:** **± 90.42 % (± 0.025 nA)**

Red values: greater than max limit
Dark red Values: lower than min limits

STRH8N10STF3 Applicable limits:	Min.	Max.	Unit
		10'000	[nA]

I_{DSS} @ V_{DS} 5V, V_{GS} 0V, Drain Current (off state) [nA] vs ^{60}Co Irradiation Total Dose [rad (Si)]

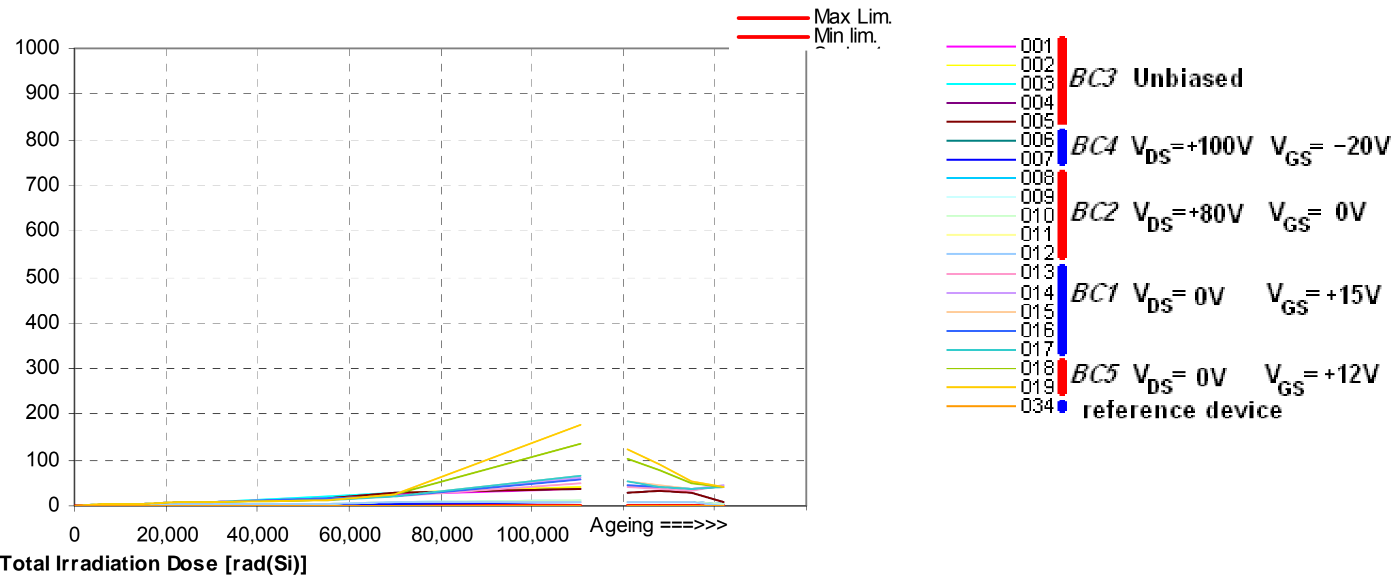


Figure 5 Data from Table 7

Table 8 – I_{DSS} @ V_{DS} 80V, V_{GS} 0V, Drain Current (off state) [nA] vs ^{60}Co Irradiation Total Dose [rad (Si)]

STRH8N10STF3 Applicable limits:	Min.	Max.	Unit
		10'000	[nA]

Detailed results - Measurement data in [nA]

s/n	0	6'197	15'000	22'500	30'062	55'000	70'067	110'500	Annealing 6hrs RT	Annealing 21hrs RT	Annealing 139hrs RT	Ageing 168hrs 100'C	Applied Bias Condition
001	0.10	2.95	5.71	11.88	14.13	25.20	37.12	50.35	39.58	42.71	36.55	10.39	(V_{DS} 0V, V_{GS} 0V)
002	0.08	2.74	5.88	12.15	14.75	26.59	37.91	54.85	40.72	42.73	38.60	10.27	(V_{DS} 0V, V_{GS} 0V)
003	0.00	2.90	6.26	12.42	14.82	26.69	37.91	50.82	40.58	42.21	38.79	10.56	(V_{DS} 0V, V_{GS} 0V)
004	0.05	3.04	6.23	11.68	14.42	24.12	37.51	51.65	39.29	42.18	38.12	10.52	(V_{DS} 0V, V_{GS} 0V)
005	0.13	2.56	5.50	11.68	14.93	24.63	38.13	54.98	53.12	65.67	67.28	10.34	(V_{DS} 0V, V_{GS} 0V)
006	0.06	1.04	1.43	2.91	3.51	6.08	9.27	13.52	10.92	10.65	10.67	5.37	(V_{DS} +100V, V_{GS} -20V)
007	0.11	1.41	1.91	3.28	4.42	7.20	10.75	13.96	12.23	12.22	10.83	5.49	(V_{DS} +100V, V_{GS} -20V)
008	0.03	1.68	3.05	5.02	6.03	11.88	15.38	17.22	16.25	15.81	15.43	3.01	(V_{DS} +80V, V_{GS} 0V)
009	0.12	1.34	2.65	5.00	5.79	11.00	14.78	16.56	16.78	16.28	17.41	3.58	(V_{DS} +80V, V_{GS} 0V)
010	0.08	1.27	2.57	5.13	6.34	12.79	15.50	19.02	18.13	16.33	15.32	3.39	(V_{DS} +80V, V_{GS} 0V)
011	0.05	1.32	2.38	4.51	5.19	9.62	13.47	16.09	15.04	13.79	13.58	2.83	(V_{DS} +80V, V_{GS} 0V)
012	0.04	1.36	2.03	4.28	4.99	9.15	13.25	16.91	15.65	16.18	17.79	3.67	(V_{DS} +80V, V_{GS} 0V)
013	0.17	7.75	15.26	34.72	44.22	124.77	206.80	536.12	345.19	345.36	287.24	112.41	(V_{DS} 0V, V_{GS} +15V)
014	0.37	7.81	16.02	36.66	45.03	122.09	207.20	592.71	340.76	314.03	264.18	112.17	(V_{DS} 0V, V_{GS} +15V)
015	0.02	7.74	15.39	34.79	44.05	117.78	206.02	582.05	357.19	322.13	270.07	110.89	(V_{DS} 0V, V_{GS} +15V)
016	0.25	8.14	15.71	36.48	44.36	122.72	211.37	583.39	333.78	312.57	274.37	109.56	(V_{DS} 0V, V_{GS} +15V)
017	0.10	7.49	14.48	33.31	41.28	107.28	190.02	518.99	322.69	293.36	264.80	114.76	(V_{DS} 0V, V_{GS} +15V)
018	0.11	7.39	15.53	34.45	42.23	107.72	208.77	648.40	415.28	364.57	268.60	107.17	(V_{DS} 0V, V_{GS} +12V)
019	0.20	6.86	14.01	30.62	39.35	97.62	194.71	740.83	439.93	374.99	271.34	111.06	(V_{DS} 0V, V_{GS} +12V)
034	0.05	1.30	0.18	0.09	0.02	0.00	0.06	1.74	1.10	0.73	0.25	0.35	Reference device

Reference device **Mean value:** **0.490** **Estimated uncertainty:** **± 104.36 % (± 0.5 nA)**

Red values: greater than max limit
Dark red Values: lower than min limits

STRH8N10STF3 Applicable limits:	Min.	Max.	Unit
		10'000	[nA]

I_{DSS} @ V_{DS} 80V, V_{GS} 0V, Drain Current (off state) [nA] vs ^{60}Co Irradiation Total Dose [rad (Si)]

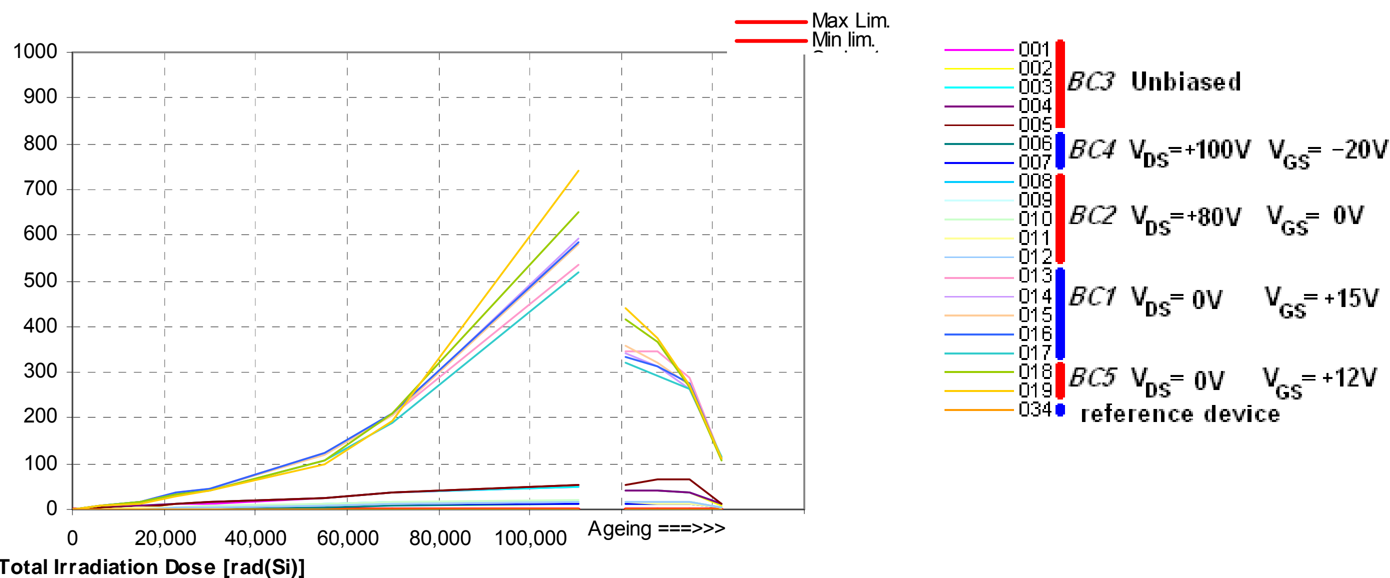


Figure 6 Data from Table 8

Table 9 – I_{DSS} @ V_{DS} 100V, V_{GS} 0V, Drain Current (off state) [nA] vs ^{60}Co Irradiation Total Dose [rad (Si)]

STRH8N10STF3 Applicable limits:	*Min.*	*Max.*	*Unit*
		10'000	[nA]

Detailed results - Measurement data in [nA]

s/n	0	6'197	15'000	22'500	30'062	55'000	70'067	110'500	Annealing 6hrs RT	Annealing 21hrs RT	Annealing 139hrs RT	Ageing 168hrs 100'C	Applied Bias Condition
001	0.06	3.30	6.39	13.17	15.66	27.85	40.89	55.06	43.61	47.19	40.35	11.30	(V_{DS} 0V, V_{GS} 0V)
002	0.21	3.04	6.56	13.38	16.41	29.13	41.78	59.81	44.64	47.12	42.65	11.23	(V_{DS} 0V, V_{GS} 0V)
003	0.15	3.15	6.80	13.65	16.32	29.30	41.65	55.34	44.39	46.48	42.51	11.43	(V_{DS} 0V, V_{GS} 0V)
004	0.40	3.31	6.85	12.92	16.07	26.55	41.38	56.48	43.30	46.74	42.24	11.32	(V_{DS} 0V, V_{GS} 0V)
005	0.11	2.79	6.17	12.86	16.53	27.06	41.88	60.96	60.72	76.10	78.23	11.19	(V_{DS} 0V, V_{GS} 0V)
006	0.24	1.20	1.88	3.58	4.08	6.68	10.37	14.69	12.02	11.87	12.05	5.67	(V_{DS} +100V, V_{GS} -20V)
007	0.09	1.60	2.37	3.94	5.04	7.92	11.88	16.22	13.45	13.85	12.53	5.82	(V_{DS} +100V, V_{GS} -20V)
008	0.20	1.92	3.50	6.79	7.91	14.70	19.29	23.21	19.86	18.40	17.04	3.26	(V_{DS} +80V, V_{GS} 0V)
009	0.17	1.68	3.25	6.65	7.72	13.80	18.21	21.67	20.33	19.24	18.96	3.83	(V_{DS} +80V, V_{GS} 0V)
010	0.12	1.62	3.26	6.82	8.24	15.32	18.98	23.23	21.45	19.69	17.39	3.64	(V_{DS} +80V, V_{GS} 0V)
011	0.17	1.44	2.91	6.06	6.99	12.16	16.75	19.84	18.34	16.63	15.40	3.06	(V_{DS} +80V, V_{GS} 0V)
012	0.10	1.43	2.71	5.85	6.87	11.87	16.73	20.18	19.04	19.24	19.54	3.94	(V_{DS} +80V, V_{GS} 0V)
013	0.15	8.40	19.48	42.34	54.50	156.12	258.41	684.52	429.93	427.56	348.40	128.68	(V_{DS} 0V, V_{GS} +15V)
014	0.09	8.67	20.11	44.48	55.24	151.87	258.16	753.35	423.74	386.91	318.72	127.97	(V_{DS} 0V, V_{GS} +15V)
015	0.34	8.66	19.46	42.53	54.34	146.85	256.86	742.68	445.55	397.64	326.58	126.34	(V_{DS} 0V, V_{GS} +15V)
016	0.09	8.92	19.93	44.45	54.56	152.66	262.81	741.98	414.94	384.71	330.65	125.03	(V_{DS} 0V, V_{GS} +15V)
017	0.11	8.19	18.36	40.82	51.46	135.58	239.15	662.85	404.04	363.68	321.28	130.78	(V_{DS} 0V, V_{GS} +15V)
018	0.21	8.18	20.56	41.37	50.91	131.06	254.44	825.43	517.34	449.10	322.95	121.54	(V_{DS} 0V, V_{GS} +12V)
019	0.12	7.52	18.14	37.44	48.41	121.85	242.75	951.68	555.33	468.37	331.38	126.38	(V_{DS} 0V, V_{GS} +12V)
034	0.30	1.75	0.41	0.17	0.31	0.31	0.24	2.28	1.58	1.18	0.31	0.35	Reference device

Reference device **Mean value:** **0.766** **Estimated uncertainty:** **± 82.72 % (± 0.634 nA)**

Red values: greater than max limit
Dark red Values: lower than min limits

STRH8N10STF3 Applicable limits:	Min.	Max.	Unit
		10'000	[nA]

I_{DSS} @ V_{DS} 100V, V_{GS} 0V, Drain Current (off state) [nA] vs ^{60}Co Irradiation Total Dose [rad (Si)]

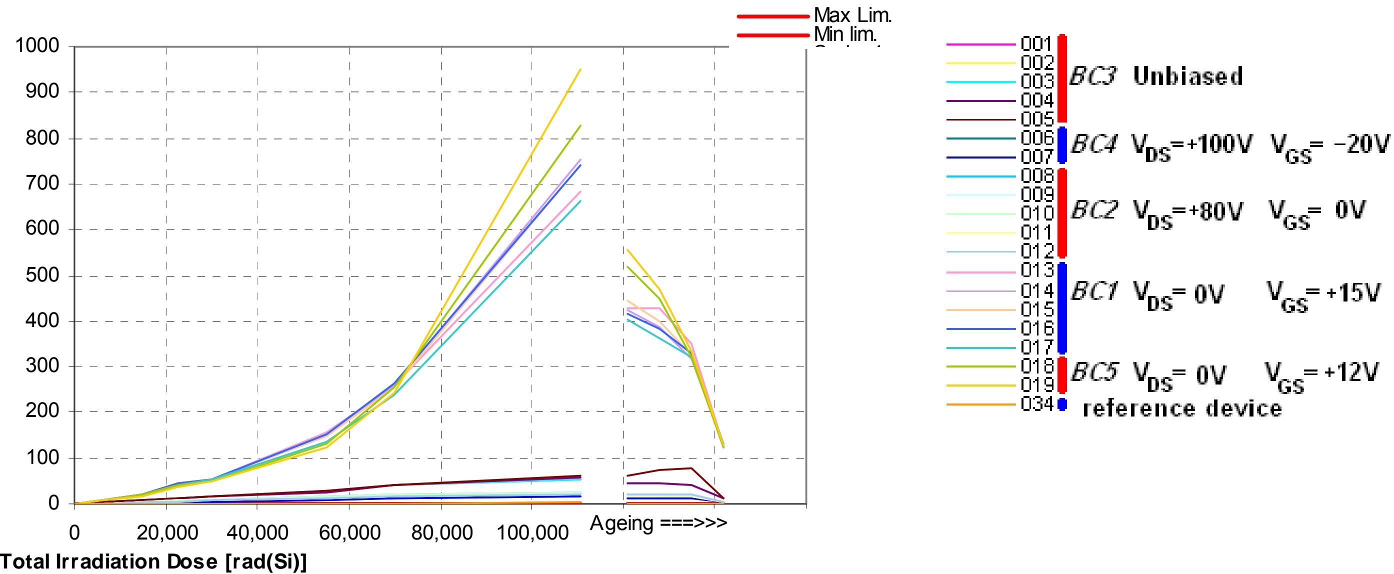


Figure 7 Data from Table 9

Table 10 – V_{GS_th} @ I_{DS} 0.01 mA, Gate Threshold Voltage [mV] vs ^{60}Co Irradiation Total Dose [rad (Si)]

STRH8N10STF3	Min.	Max.	Unit
Applicable limits:	2'000	4'500	[mV]

Detailed results - Measurement data in [mV]

s/n	0	6'197	15'000	22'500	30'062	55'000	70'067	110'500	Annealing 6hrs RT	Annealing 21hrs RT	Annealing 139hrs RT	Ageing 168hrs 100'C	Applied Bias Condition
001	3,465.81	3,273.19	3,023.50	2,811.63	2,693.44	2,206.38	**1,959.50**	**1,532.31**	**1,571.63**	**1,552.31**	**1,576.88**	2,559.25	(V_{DS} 0V, V_{GS} 0V)
002	3,456.94	3,272.38	3,030.13	2,804.13	2,644.50	2,183.75	**1,940.94**	**1,512.69**	**1,558.75**	**1,544.13**	**1,554.25**	2,564.31	(V_{DS} 0V, V_{GS} 0V)
003	3,427.44	3,252.13	3,004.38	2,785.25	2,624.50	2,156.94	**1,918.94**	**1,499.88**	**1,537.88**	**1,522.88**	**1,550.06**	2,530.75	(V_{DS} 0V, V_{GS} 0V)
004	3,443.75	3,258.25	3,019.69	2,797.81	2,646.88	2,180.94	**1,935.81**	**1,512.50**	**1,549.56**	**1,540.69**	**1,551.63**	2,548.38	(V_{DS} 0V, V_{GS} 0V)
005	3,439.81	3,267.75	3,030.06	2,810.31	2,634.56	2,193.69	**1,947.19**	**1,528.13**	**1,563.88**	**1,552.00**	**1,573.69**	2,525.19	(V_{DS} 0V, V_{GS} 0V)
006	3,525.75	3,457.69	3,321.06	3,183.13	3,094.31	2,796.25	2,596.75	2,192.13	2,211.56	2,226.00	2,282.06	2,732.31	(V_{DS} +100V, V_{GS} -20V)
007	3,463.38	3,391.50	3,256.81	3,133.13	3,042.63	2,746.69	2,555.31	2,148.06	2,160.75	2,178.69	2,240.81	2,693.75	(V_{DS} +100V, V_{GS} -20V)
008	3,519.69	3,354.31	3,105.25	2,876.06	2,714.75	2,228.44	**1,982.81**	**1,540.88**	**1,559.75**	**1,555.69**	**1,552.25**	2,657.31	(V_{DS} +80V, V_{GS} 0V)
009	3,475.69	3,313.50	3,065.38	2,833.81	2,675.69	2,197.19	**1,954.19**	**1,523.00**	**1,532.00**	**1,534.50**	**1,533.63**	2,598.19	(V_{DS} +80V, V_{GS} 0V)
010	3,483.50	3,302.75	3,065.94	2,837.19	2,678.88	2,209.31	**1,968.88**	**1,530.25**	**1,545.19**	**1,544.13**	**1,540.88**	2,574.06	(V_{DS} +80V, V_{GS} 0V)
011	3,460.69	3,284.94	3,038.44	2,813.00	2,657.38	2,195.13	**1,944.75**	**1,506.88**	**1,531.06**	**1,533.56**	**1,527.31**	2,542.75	(V_{DS} +80V, V_{GS} 0V)
012	3,465.06	3,299.81	3,055.44	2,827.94	2,664.63	2,200.63	**1,950.88**	**1,524.19**	**1,537.00**	**1,536.25**	**1,524.31**	2,548.88	(V_{DS} +80V, V_{GS} 0V)
013	3,556.94	3,326.75	3,022.88	2,785.44	2,623.38	2,147.88	**1,888.88**	**1,408.50**	**1,404.56**	**1,504.50**	**1,717.13**	3,873.75	(V_{DS} 0V, V_{GS} +15V)
014	3,496.56	3,260.44	2,958.50	2,715.63	2,558.75	2,095.00	**1,826.19**	**1,329.94**	**1,353.25**	**1,459.00**	**1,660.69**	3,791.44	(V_{DS} 0V, V_{GS} +15V)
015	3,444.44	3,199.00	2,893.81	2,653.13	2,485.19	2,018.44	**1,751.38**	**1,258.06**	**1,282.81**	**1,369.88**	**1,596.06**	3,721.19	(V_{DS} 0V, V_{GS} +15V)
016	3,510.38	3,265.50	2,969.31	2,731.31	2,576.31	2,105.63	**1,833.63**	**1,341.94**	**1,377.88**	**1,461.81**	**1,684.81**	3,810.00	(V_{DS} 0V, V_{GS} +15V)
017	3,470.81	3,212.88	2,913.00	2,658.38	2,498.50	2,027.81	**1,740.31**	**1,244.00**	**1,266.88**	**1,368.44**	**1,579.88**	3,650.69	(V_{DS} 0V, V_{GS} +15V)
018	3,481.00	3,203.50	2,877.38	2,612.25	2,428.25	**1,918.94**	**1,593.88**	**1,065.38**	**1,094.31**	**1,200.81**	**1,411.94**	3,710.13	(V_{DS} 0V, V_{GS} +12V)
019	3,482.25	3,185.19	2,847.88	2,585.94	2,392.81	**1,869.50**	**1,544.44**	**979.69**	**1,024.38**	**1,123.38**	**1,337.44**	3,554.31	(V_{DS} 0V, V_{GS} +12V)
034	3,486.06	3,520.81	3,518.31	3,489.81	3,494.13	3,517.63	3,496.69	3,521.81	3,528.25	3,518.88	3,522.13	3,538.44	Reference device

Reference device **Mean value:** 3,512.75 **Estimated uncertainty:** ± 0.41 % (± 14.5 mV)

Red values: greater than max limit
Dark red Values: lower than min limits

STRH8N10STF3 Applicable limits:	*Min.*	*Max.*	*Unit*
	2'000	4'500	[mV]

V_{GS_th} @ I_{DS} 0.01 mA, Gate Threshold Voltage [mV] vs ^{60}Co Irradiation Total Dose [rad (Si)]

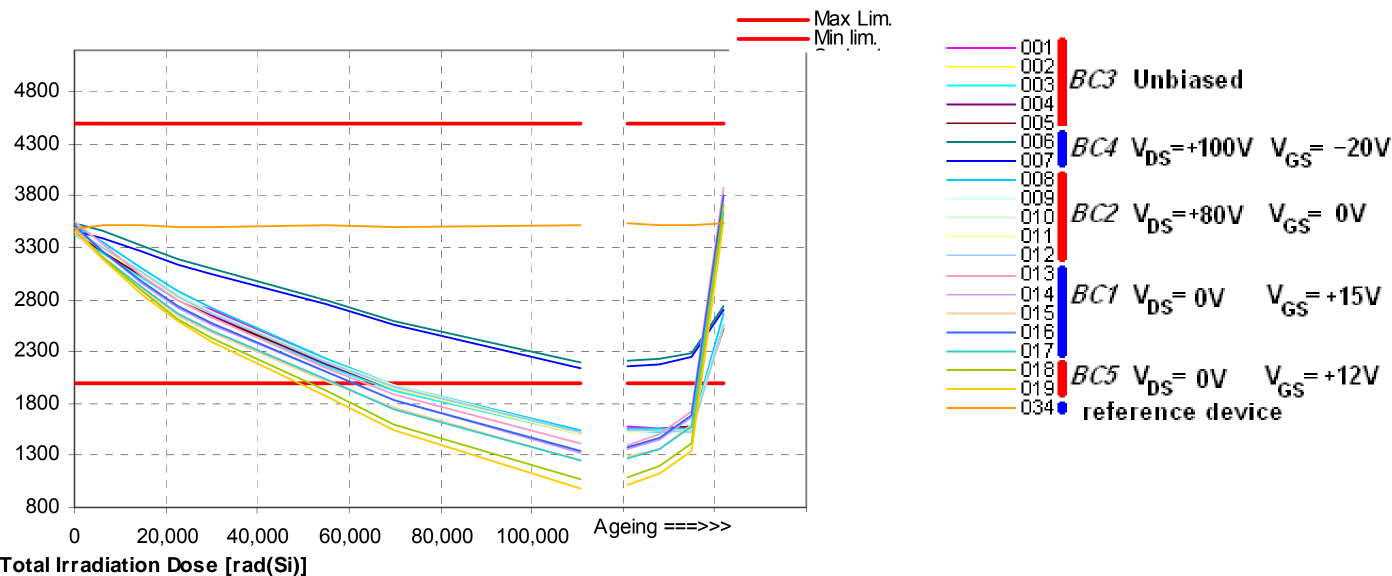


Figure 8 Data from Table 10

Table 11 – V_{GS_th} @ I_{DS} 0.10 mA, Gate Threshold Voltage [mV] vs ^{60}Co Irradiation Total Dose [rad (Si)]

STRH8N10STF3 Applicable limits:	*Min.*	*Max.*	*Unit*
	2'000	4'500	[mV]

Detailed results - Measurement data in [mV]

s/n	0	6'197	15'000	22'500	30'062	55'000	70'067	110'500	Annealing 6hrs RT	Annealing 21hrs RT	Annealing 139hrs RT	Ageing 168hrs 100'C	Applied Bias Condition
001	3,714.25	3,525.94	3,298.44	3,083.94	2,966.69	2,507.94	2,267.38	**1,855.56**	**1,888.44**	**1,879.63**	**1,900.25**	2,812.75	(V_{DS} 0V, V_{GS} 0V)
002	3,715.50	3,531.63	3,294.06	3,084.25	2,924.44	2,475.69	2,246.81	**1,840.31**	**1,880.06**	**1,865.19**	**1,881.31**	2,821.88	(V_{DS} 0V, V_{GS} 0V)
003	3,679.06	3,501.19	3,261.56	3,054.69	2,898.63	2,450.44	2,223.38	**1,819.81**	**1,852.00**	**1,843.81**	**1,856.44**	2,781.25	(V_{DS} 0V, V_{GS} 0V)
004	3,695.50	3,521.25	3,290.13	3,075.94	2,921.31	2,476.94	2,242.63	**1,838.81**	**1,875.63**	**1,859.00**	**1,873.50**	2,805.81	(V_{DS} 0V, V_{GS} 0V)
005	3,692.63	3,526.38	3,289.25	3,079.81	2,916.94	2,484.50	2,251.31	**1,853.00**	**1,879.81**	**1,872.19**	**1,884.94**	2,783.81	(V_{DS} 0V, V_{GS} 0V)
006	3,780.19	3,705.13	3,581.50	3,449.94	3,360.75	3,078.56	2,898.19	2,502.19	2,507.31	2,525.13	2,583.81	3,031.94	(V_{DS} +100V, V_{GS} -20V)
007	3,715.75	3,644.19	3,518.94	3,392.44	3,301.56	3,026.81	2,846.19	2,457.75	2,461.69	2,478.50	2,548.81	2,991.75	(V_{DS} +100V, V_{GS} -20V)
008	3,781.38	3,610.88	3,370.81	3,156.25	3,001.50	2,530.88	2,294.88	**1,862.56**	**1,885.56**	**1,880.31**	**1,868.63**	2,910.63	(V_{DS} +80V, V_{GS} 0V)
009	3,732.50	3,563.25	3,327.88	3,113.38	2,947.19	2,498.44	2,254.50	**1,836.75**	**1,852.44**	**1,848.63**	**1,844.31**	2,845.75	(V_{DS} +80V, V_{GS} 0V)
010	3,731.00	3,568.06	3,331.88	3,108.69	2,957.50	2,503.81	2,267.81	**1,847.81**	**1,866.38**	**1,856.94**	**1,850.19**	2,833.19	(V_{DS} +80V, V_{GS} 0V)
011	3,710.56	3,542.13	3,301.44	3,087.38	2,934.50	2,484.81	2,243.31	**1,835.63**	**1,846.75**	**1,846.13**	**1,833.31**	2,800.38	(V_{DS} +80V, V_{GS} 0V)
012	3,717.63	3,558.69	3,312.38	3,093.94	2,945.44	2,496.06	2,254.75	**1,837.81**	**1,852.44**	**1,852.31**	**1,840.25**	2,808.13	(V_{DS} +80V, V_{GS} 0V)
013	3,815.19	3,601.25	3,327.69	3,110.50	2,957.94	2,549.06	2,316.50	**1,907.94**	**1,903.25**	2,016.00	2,243.88	4,463.13	(V_{DS} 0V, V_{GS} +15V)
014	3,746.06	3,526.75	3,261.50	3,037.06	2,898.94	2,491.38	2,248.31	**1,830.63**	**1,853.25**	**1,951.63**	2,185.13	4,385.06	(V_{DS} 0V, V_{GS} +15V)
015	3,695.88	3,472.56	3,193.25	2,975.75	2,827.63	2,415.38	2,177.13	**1,761.13**	**1,771.75**	**1,869.44**	2,105.25	4,319.44	(V_{DS} 0V, V_{GS} +15V)
016	3,765.88	3,541.81	3,265.25	3,055.25	2,908.75	2,496.44	2,266.50	**1,847.56**	**1,871.00**	**1,963.25**	2,208.81	4,406.81	(V_{DS} 0V, V_{GS} +15V)
017	3,721.81	3,485.06	3,204.94	2,985.13	2,831.94	2,412.31	2,167.63	**1,733.81**	**1,757.44**	**1,851.19**	2,092.00	4,238.06	(V_{DS} 0V, V_{GS} +15V)
018	3,735.56	3,483.13	3,179.69	2,932.19	2,770.25	2,315.06	2,030.31	**1,564.56**	**1,592.63**	**1,691.44**	**1,934.25**	4,326.19	(V_{DS} 0V, V_{GS} +12V)
019	3,734.31	3,461.31	3,149.88	2,909.44	2,732.13	2,258.00	**1,968.81**	**1,456.75**	**1,500.94**	**1,602.38**	**1,843.56**	4,163.00	(V_{DS} 0V, V_{GS} +12V)
034	3,742.69	3,775.69	3,766.50	3,739.81	3,749.44	3,758.00	3,750.63	3,768.81	3,774.06	3,766.31	3,772.56	3,786.31	Reference device

Reference device **Mean value:** 3,762.57 **Estimated uncertainty:** ± 0.33 % (± 12.5 mV)

Red values: greater than max limit
Dark red Values: lower than min limits

STRH8N10STF3 Applicable limits:	*Min.* 2'000	*Max.* 4'500	*Unit* [mV]

V_{GS_th} @ I_{DS} 0.10 mA, Gate Threshold Voltage [mV] vs ^{60}Co Irradiation Total Dose [rad (Si)]

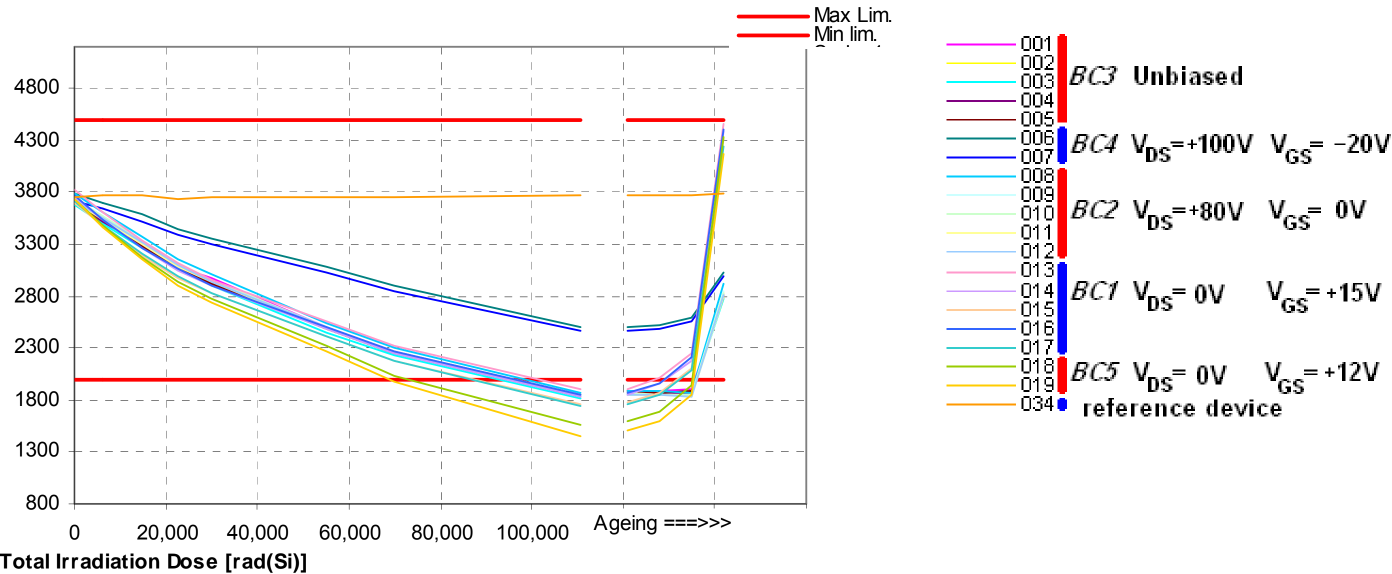


Figure 9 Data from Table 11

Table 12 – V_{GS_th} @ I_{DS} 0.25 mA, Gate Threshold Voltage [mV] vs ^{60}Co Irradiation Total Dose [rad (Si)]

STRH8N10STF3 Applicable limits:	Min.	Max.	Unit
	2'000	4'500	[mV]

Detailed results - Measurement data in [mV]

s/n	0	6'197	15'000	22'500	30'062	55'000	70'067	110'500	Annealing 6hrs RT	Annealing 21hrs RT	Annealing 139hrs RT	Ageing 168hrs 100'C	Applied Bias Condition
001	3,812.19	3,636.00	3,402.69	3,197.50	3,082.00	2,628.38	2,396.13	1,999.13	2,024.19	2,011.69	2,028.25	2,913.13	(V_{DS} 0V, V_{GS} 0V)
002	3,812.06	3,635.88	3,400.06	3,193.44	3,042.94	2,599.31	2,374.56	1,973.81	2,008.13	2,002.69	2,012.31	2,928.56	(V_{DS} 0V, V_{GS} 0V)
003	3,780.63	3,603.75	3,373.06	3,162.06	3,009.50	2,578.06	2,353.56	1,966.25	1,994.75	1,977.56	1,988.56	2,889.63	(V_{DS} 0V, V_{GS} 0V)
004	3,801.38	3,622.25	3,394.63	3,186.56	3,033.31	2,600.88	2,370.13	1,973.38	2,007.81	1,992.88	2,004.63	2,906.75	(V_{DS} 0V, V_{GS} 0V)
005	3,793.00	3,623.88	3,391.19	3,184.56	3,035.00	2,603.19	2,369.06	1,990.44	2,015.44	1,998.31	2,009.88	2,895.19	(V_{DS} 0V, V_{GS} 0V)
006	3,883.31	3,809.31	3,691.00	3,566.38	3,478.13	3,196.50	3,015.38	2,630.94	2,643.44	2,650.69	2,711.19	3,161.50	(V_{DS} +100V, V_{GS} -20V)
007	3,813.88	3,745.13	3,622.69	3,506.06	3,410.88	3,147.00	2,960.81	2,584.81	2,589.19	2,606.50	2,671.25	3,111.75	(V_{DS} +100V, V_{GS} -20V)
008	3,884.19	3,720.63	3,480.88	3,270.06	3,113.50	2,652.25	2,418.06	2,006.06	2,025.94	2,007.63	1,995.81	3,019.31	(V_{DS} +80V, V_{GS} 0V)
009	3,833.69	3,668.88	3,437.56	3,220.75	3,067.25	2,622.63	2,385.69	1,980.88	1,989.63	1,986.44	1,971.75	2,957.00	(V_{DS} +80V, V_{GS} 0V)
010	3,835.00	3,668.81	3,433.88	3,223.13	3,068.25	2,624.75	2,394.19	1,987.50	1,996.38	1,989.25	1,977.75	2,933.38	(V_{DS} +80V, V_{GS} 0V)
011	3,806.44	3,639.94	3,409.50	3,196.13	3,048.63	2,599.69	2,367.19	1,964.56	1,976.63	1,973.00	1,963.31	2,900.69	(V_{DS} +80V, V_{GS} 0V)
012	3,816.69	3,650.88	3,422.44	3,208.25	3,053.31	2,611.81	2,382.88	1,975.75	1,983.06	1,977.69	1,971.88	2,911.94	(V_{DS} +80V, V_{GS} 0V)
013	3,920.06	3,714.44	3,448.50	3,246.13	3,099.94	2,716.56	2,488.25	2,121.81	2,111.63	2,220.38	2,451.50	4,716.00	(V_{DS} 0V, V_{GS} +15V)
014	3,847.88	3,645.69	3,379.50	3,164.75	3,032.88	2,646.25	2,424.63	2,042.06	2,056.88	2,153.81	2,393.88	4,634.88	(V_{DS} 0V, V_{GS} +15V)
015	3,804.25	3,581.50	3,323.31	3,103.81	2,966.19	2,576.25	2,347.81	1,968.63	1,974.31	2,078.88	2,322.56	4,565.69	(V_{DS} 0V, V_{GS} +15V)
016	3,863.00	3,648.31	3,390.38	3,182.00	3,048.19	2,661.88	2,441.81	2,061.88	2,075.00	2,170.06	2,423.50	4,662.50	(V_{DS} 0V, V_{GS} +15V)
017	3,818.13	3,599.06	3,329.06	3,111.06	2,963.06	2,576.25	2,333.88	1,934.13	1,950.19	2,056.44	2,299.50	4,488.31	(V_{DS} 0V, V_{GS} +15V)
018	3,839.19	3,596.69	3,301.63	3,071.88	2,905.88	2,476.88	2,212.50	1,775.50	1,794.19	1,894.69	2,143.13	4,582.25	(V_{DS} 0V, V_{GS} +12V)
019	3,833.56	3,576.75	3,273.13	3,038.94	2,865.75	2,410.94	2,135.75	1,664.00	1,697.38	1,801.31	2,054.44	4,419.38	(V_{DS} 0V, V_{GS} +12V)
034	3,841.75	3,873.88	3,865.19	3,844.38	3,847.63	3,863.56	3,849.06	3,870.44	3,882.44	3,867.25	3,868.69	3,885.00	Reference device

Reference device **Mean value:** 3,863.3 **Estimated uncertainty:** ± 0.33 % (± 12.6 mV)

Red values: greater than max limit
Dark red Values: lower than min limits

STRH8N10STF3 Applicable limits:	Min.	Max.	Unit
	2'000	4'500	[mV]

V_{GS_th} @ I_{DS} 0.25 mA, Gate Threshold Voltage [mV] vs ^{60}Co Irradiation Total Dose [rad (Si)]

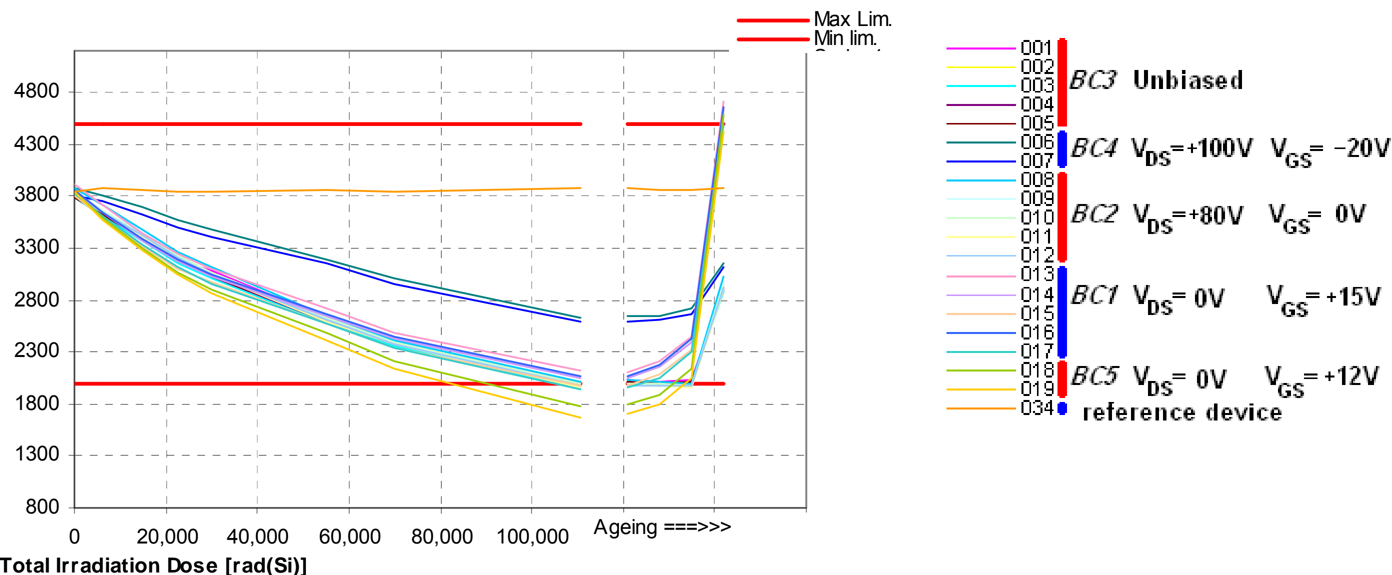


Figure 10 Data from Table 12

Table 13 – V_{GS_th} @ I_{DS} 1.0 mA, Gate Threshold Voltage [mV] vs ^{60}Co Irradiation Total Dose [rad (Si)]

STRH8N10STF3 Applicable limits:	Min.	Max.	Unit
	2'000	4'500	[mV]

Detailed results - Measurement data in [mV]

s/n	0	6'197	15'000	22'500	30'062	55'000	70'067	110'500	Annealing 6hrs RT	Annealing 21hrs RT	Annealing 139hrs RT	Ageing 168hrs 100'C	Applied Bias Condition
001	3,970.19	3,787.44	3,570.44	3,366.31	3,251.81	2,809.13	2,591.25	2,209.31	2,230.25	2,218.13	2,233.94	3,079.25	(V_{DS} 0V, V_{GS} 0V)
002	3,964.69	3,794.00	3,565.56	3,366.31	3,211.69	2,780.56	2,569.81	2,186.00	2,220.00	2,205.19	2,214.19	3,089.56	(V_{DS} 0V, V_{GS} 0V)
003	3,927.75	3,767.19	3,532.81	3,337.06	3,184.44	2,761.75	2,545.63	2,169.81	2,195.75	2,181.44	2,194.25	3,054.31	(V_{DS} 0V, V_{GS} 0V)
004	3,958.31	3,788.69	3,558.50	3,361.50	3,210.13	2,787.63	2,565.19	2,185.38	2,206.69	2,198.13	2,203.00	3,067.69	(V_{DS} 0V, V_{GS} 0V)
005	3,944.63	3,780.94	3,553.31	3,357.06	3,198.31	2,786.31	2,569.00	2,194.69	2,215.50	2,206.13	2,212.38	3,049.06	(V_{DS} 0V, V_{GS} 0V)
006	4,037.81	3,970.69	3,852.94	3,727.63	3,645.31	3,379.50	3,207.75	2,828.31	2,833.94	2,849.38	2,902.19	3,355.56	(V_{DS} +100V, V_{GS} -20V)
007	3,967.19	3,899.63	3,787.88	3,669.63	3,583.88	3,316.81	3,143.56	2,783.88	2,777.06	2,796.56	2,856.81	3,301.31	(V_{DS} +100V, V_{GS} -20V)
008	4,034.06	3,880.38	3,647.44	3,441.06	3,289.81	2,843.38	2,622.31	2,214.25	2,231.06	2,223.56	2,201.38	3,182.50	(V_{DS} +80V, V_{GS} 0V)
009	3,982.50	3,824.81	3,607.81	3,395.94	3,242.44	2,803.63	2,579.44	2,191.81	2,191.06	2,189.56	2,174.81	3,113.63	(V_{DS} +80V, V_{GS} 0V)
010	3,988.38	3,827.56	3,604.88	3,393.25	3,236.44	2,809.38	2,579.44	2,186.44	2,194.94	2,190.75	2,182.69	3,098.56	(V_{DS} +80V, V_{GS} 0V)
011	3,958.75	3,804.94	3,571.69	3,370.25	3,218.00	2,791.44	2,562.56	2,172.81	2,176.63	2,176.94	2,161.13	3,064.44	(V_{DS} +80V, V_{GS} 0V)
012	3,974.94	3,813.38	3,589.25	3,384.00	3,225.50	2,797.25	2,571.50	2,187.38	2,191.50	2,179.31	2,162.31	3,069.25	(V_{DS} +80V, V_{GS} 0V)
013	4,070.31	3,883.56	3,638.06	3,444.56	3,314.19	2,956.19	2,757.00	2,429.38	2,416.50	2,525.38	2,767.19	**5,055.63**	(V_{DS} 0V, V_{GS} +15V)
014	4,001.19	3,819.13	3,567.94	3,369.38	3,239.25	2,887.06	2,687.88	2,348.38	2,364.31	2,455.19	2,699.94	**4,971.50**	(V_{DS} 0V, V_{GS} +15V)
015	3,950.69	3,758.31	3,505.94	3,306.13	3,171.19	2,817.81	2,609.19	2,271.06	2,271.63	2,373.63	2,628.94	**4,905.13**	(V_{DS} 0V, V_{GS} +15V)
016	4,015.44	3,825.75	3,577.38	3,377.63	3,249.19	2,905.69	2,704.13	2,367.88	2,377.00	2,475.06	2,735.31	**4,998.25**	(V_{DS} 0V, V_{GS} +15V)
017	3,971.50	3,777.13	3,517.44	3,313.25	3,175.63	2,805.50	2,594.38	2,233.19	2,250.69	2,345.50	2,605.75	**4,827.13**	(V_{DS} 0V, V_{GS} +15V)
018	3,997.75	3,772.19	3,483.00	3,271.06	3,115.31	2,714.06	2,469.00	2,078.31	2,084.38	2,189.19	2,450.94	**4,936.69**	(V_{DS} 0V, V_{GS} +12V)
019	3,983.38	3,756.75	3,463.69	3,242.00	3,076.06	2,657.56	2,400.50	**1,960.75**	**1,985.94**	2,099.38	2,356.50	**4,766.94**	(V_{DS} 0V, V_{GS} +12V)
034	3,998.81	4,019.81	4,020.31	4,002.13	4,003.63	4,019.19	4,002.00	4,030.25	4,023.63	4,023.13	4,027.38	4,027.19	Reference device

Reference device **Mean value:** 4,016.45 **Estimated uncertainty:** ± 0.25 % (± 9.924 mV)

Red values: greater than max limit
Dark red Values: lower than min limits

STRH8N10STF3 Applicable limits:	*Min.* 2'000	*Max.* 4'500	*Unit* [mV]

V_{GS_th} @ I_{DS} 1.0 mA, Gate Threshold Voltage [mV] vs ^{60}Co Irradiation Total Dose [rad (Si)]

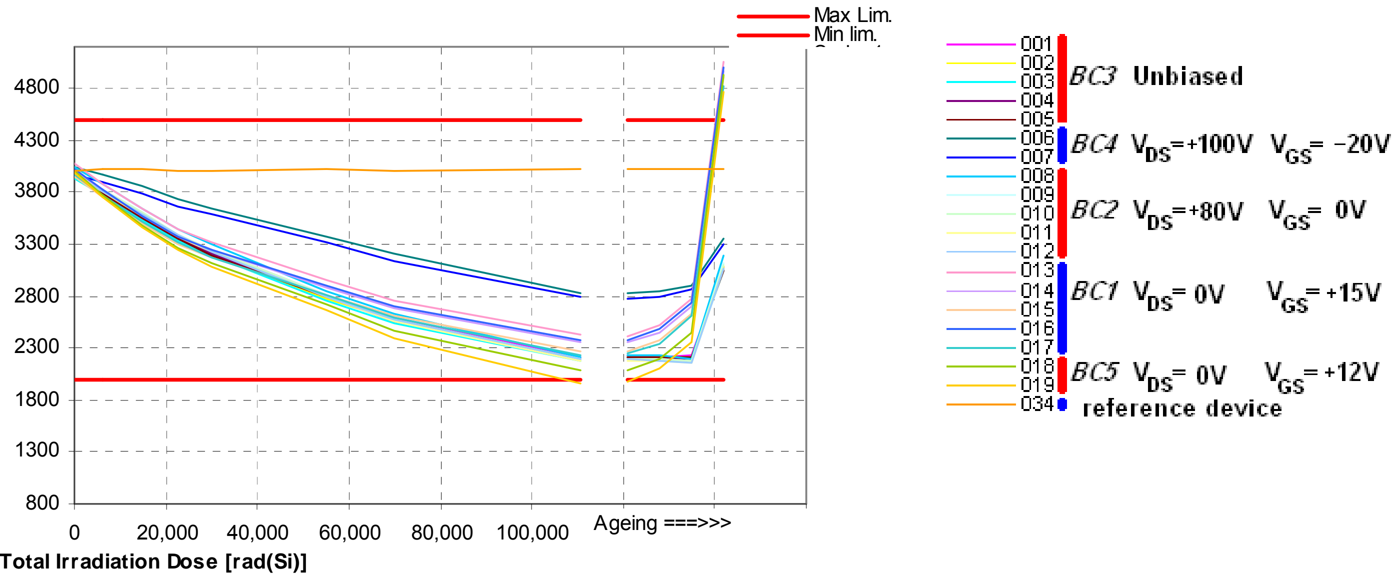


Figure 11 Data from Table 13

Table 14 – RDS(on) Drain-Source On-Resistance [Ohm] vs ^{60}Co Irradiation Total Dose [rad (Si)]

STRH8N10STF3	Min.	Max.	Unit
Applicable limits:		n.d.	[Ohm]

Detailed results - Measurement data in [Ohm]

s/n	0	6'197	15'000	22'500	30'062	55'000	70'067	110'500	Annealing 6hrs RT	Annealing 21hrs RT	Annealing 139hrs RT	Ageing 168hrs 100'C	Applied Bias Condition
001	0.241	0.240	0.236	0.241	0.239	0.239	0.243	0.240	0.237	0.238	0.236	0.232	(V_{DS} 0V, V_{GS} 0V)
002	0.241	0.238	0.235	0.243	0.240	0.241	0.245	0.243	0.239	0.239	0.238	0.232	(V_{DS} 0V, V_{GS} 0V)
003	0.242	0.237	0.236	0.242	0.238	0.240	0.242	0.242	0.236	0.238	0.238	0.232	(V_{DS} 0V, V_{GS} 0V)
004	0.240	0.235	0.233	0.241	0.238	0.236	0.243	0.240	0.234	0.236	0.236	0.231	(V_{DS} 0V, V_{GS} 0V)
005	0.243	0.237	0.235	0.242	0.242	0.239	0.244	0.241	0.237	0.239	0.239	0.232	(V_{DS} 0V, V_{GS} 0V)
006	0.243	0.236	0.235	0.243	0.239	0.238	0.243	0.240	0.235	0.234	0.235	0.231	(V_{DS} +100V, V_{GS} -20V)
007	0.243	0.237	0.237	0.243	0.240	0.239	0.244	0.238	0.234	0.237	0.235	0.233	(V_{DS} +100V, V_{GS} -20V)
008	0.247	0.241	0.239	0.245	0.242	0.245	0.246	0.241	0.239	0.238	0.238	0.235	(V_{DS} +80V, V_{GS} 0V)
009	0.245	0.238	0.237	0.244	0.242	0.240	0.244	0.238	0.236	0.235	0.236	0.232	(V_{DS} +80V, V_{GS} 0V)
010	0.242	0.237	0.235	0.244	0.239	0.240	0.242	0.238	0.236	0.236	0.236	0.232	(V_{DS} +80V, V_{GS} 0V)
011	0.244	0.237	0.236	0.244	0.241	0.240	0.243	0.238	0.236	0.236	0.235	0.232	(V_{DS} +80V, V_{GS} 0V)
012	0.245	0.238	0.237	0.245	0.240	0.240	0.243	0.238	0.236	0.237	0.237	0.232	(V_{DS} +80V, V_{GS} 0V)
013	0.248	0.238	0.237	0.246	0.242	0.244	0.245	0.240	0.241	0.240	0.240	0.245	(V_{DS} 0V, V_{GS} +15V)
014	0.242	0.237	0.235	0.242	0.239	0.239	0.242	0.240	0.236	0.237	0.238	0.243	(V_{DS} 0V, V_{GS} +15V)
015	0.244	0.237	0.236	0.245	0.241	0.241	0.245	0.240	0.240	0.238	0.239	0.245	(V_{DS} 0V, V_{GS} +15V)
016	0.246	0.241	0.238	0.246	0.243	0.243	0.246	0.243	0.240	0.240	0.243	0.245	(V_{DS} 0V, V_{GS} +15V)
017	0.246	0.238	0.236	0.245	0.241	0.241	0.245	0.239	0.237	0.238	0.241	0.243	(V_{DS} 0V, V_{GS} +15V)
018	0.244	0.236	0.236	0.242	0.239	0.240	0.245	0.239	0.237	0.237	0.238	0.242	(V_{DS} 0V, V_{GS} +12V)
019	0.245	0.235	0.235	0.241	0.238	0.237	0.244	0.238	0.235	0.236	0.237	0.239	(V_{DS} 0V, V_{GS} +12V)
034	0.245	0.236	0.238	0.244	0.243	0.240	0.244	0.236	0.234	0.238	0.235	0.234	Reference device

Reference device **Mean value:** 0.239 **Estimated uncertainty:** ± 1.5 %

Red values: greater than max limit
Dark red Values: lower than min limits

Note: This Parameter is not listed in Manufacturer Test Condition Log HGOC.tst, dated 09.09.2009. The parameter was measured to monitor its TID sensitivity.

STRH8N10STF3	*Min.*	*Max.*	*Unit*
Applicable limits:		n.d.	[Ohm]

RDS(on) Drain-Source On-Resistance [Ohm] vs ^{60}Co Irradiation Total Dose [rad (Si)]

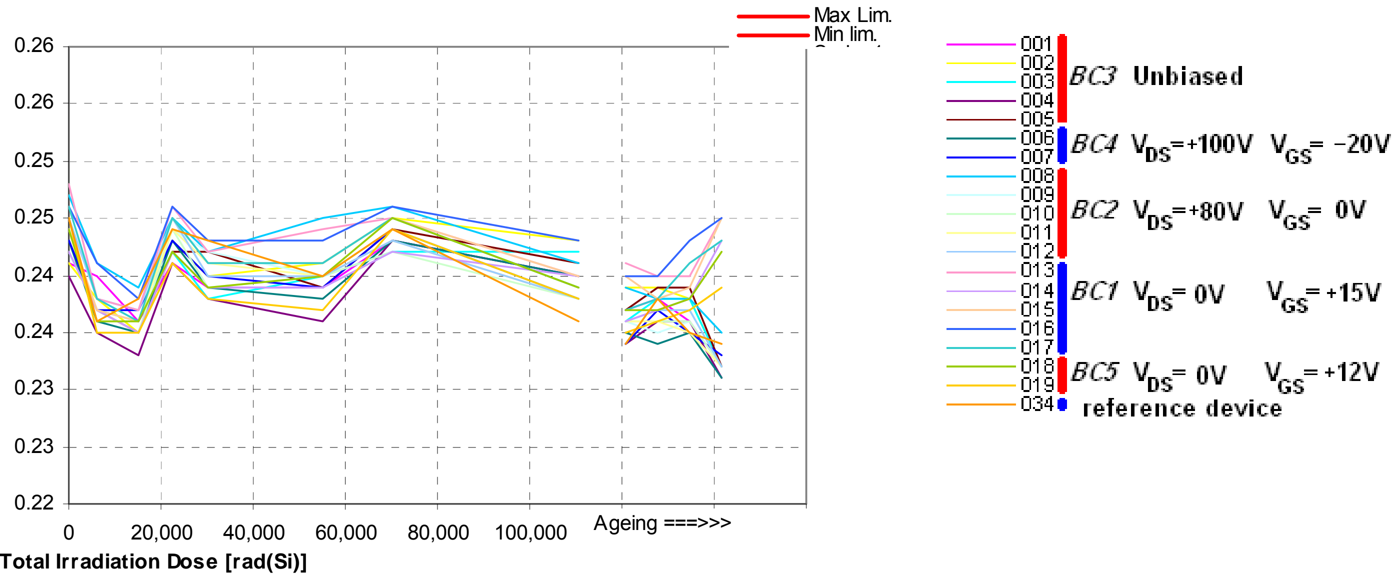


Figure 12 Data from Table 14

Table 15 – V_{SD}(on) Inverse Diode Forward Voltage [mV] vs ^{60}Co Irradiation Total Dose [rad (Si)]

STRH8N10STF3	*Min.*	*Max.*	*Unit*
Applicable limits:		1'200	[mV]

Detailed results - Measurement data in [mV]

s/n	0	6'197	15'000	22'500	30'062	55'000	70'067	110'500	Annealing 6hrs RT	Annealing 21hrs RT	Annealing 139hrs RT	Ageing 168hrs 100'C	Applied Bias Condition
001	981.345	981.553	982.955	978.977	979.716	978.674	975.208	973.750	977.045	978.239	977.746	978.409	(V_{DS} 0V, V_{GS} 0V)
002	981.155	981.383	981.667	977.008	977.670	978.864	972.519	972.519	976.023	975.568	972.064	978.617	(V_{DS} 0V, V_{GS} 0V)
003	982.557	986.193	986.989	981.042	980.739	977.595	974.943	977.936	978.523	977.367	976.667	982.273	(V_{DS} 0V, V_{GS} 0V)
004	982.197	985.227	987.538	981.023	980.777	980.322	974.299	976.629	979.299	978.561	979.034	981.477	(V_{DS} 0V, V_{GS} 0V)
005	980.492	983.617	983.523	979.640	979.280	981.780	974.773	975.473	977.955	975.549	974.451	981.326	(V_{DS} 0V, V_{GS} 0V)
006	980.114	983.693	985.852	981.439	982.405	983.239	977.443	980.871	977.917	981.231	982.159	982.822	(V_{DS} +100V, V_{GS} -20V)
007	978.409	981.742	981.288	979.659	976.705	978.636	976.610	976.742	978.106	977.140	977.955	981.023	(V_{DS} +100V, V_{GS} -20V)
008	977.917	980.720	982.292	977.500	978.636	974.053	973.693	975.038	975.663	974.223	970.909	978.201	(V_{DS} +80V, V_{GS} 0V)
009	978.826	978.939	981.761	976.629	976.345	973.598	972.614	971.439	972.557	973.295	972.898	979.470	(V_{DS} +80V, V_{GS} 0V)
010	979.356	980.360	981.913	976.004	976.534	975.303	972.936	973.125	973.807	971.439	972.008	977.689	(V_{DS} +80V, V_{GS} 0V)
011	977.443	982.386	981.326	975.833	976.212	973.920	971.269	974.394	971.250	974.811	969.413	976.875	(V_{DS} +80V, V_{GS} 0V)
012	979.261	983.864	983.845	979.053	980.947	978.447	974.015	977.386	976.951	977.008	976.117	980.890	(V_{DS} +80V, V_{GS} 0V)
013	976.913	981.402	982.273	976.705	978.883	978.163	975.928	979.678	980.341	979.489	981.345	984.886	(V_{DS} 0V, V_{GS} +15V)
014	976.572	979.356	981.837	975.473	978.068	976.742	974.280	977.159	978.220	978.542	979.811	983.883	(V_{DS} 0V, V_{GS} +15V)
015	978.845	981.799	983.049	976.742	978.958	977.936	975.871	976.686	980.966	981.098	980.379	984.356	(V_{DS} 0V, V_{GS} +15V)
016	978.712	981.818	984.148	976.686	979.034	979.129	975.777	978.674	978.371	980.852	980.549	985.398	(V_{DS} 0V, V_{GS} +15V)
017	978.239	982.955	983.314	978.864	980.568	979.356	975.189	979.905	980.530	982.159	980.739	986.193	(V_{DS} 0V, V_{GS} +15V)
018	978.428	980.606	982.973	977.121	980.360	980.152	974.773	975.701	978.068	979.072	980.814	984.489	(V_{DS} 0V, V_{GS} +12V)
019	978.920	984.205	982.197	980.417	979.602	980.436	976.155	976.439	979.981	979.792	983.295	987.519	(V_{DS} 0V, V_{GS} +12V)
034	980.758	984.053	984.621	980.947	980.360	983.750	981.004	985.360	986.193	984.205	985.189	987.670	Reference device

Reference device **Mean value:** **983.68** **Estimated uncertainty:** **± 0.21 % (± 2.1 mV)**

Red values: greater than max limit
Dark red Values: lower than min limits

STRH8N10STF3 Applicable limits:	Min.	Max.	Unit
		1'200	[mV]

V_{SD}(on) Inverse Diode Forward Voltage [mV] vs ^{60}Co Irradiation Total Dose [rad (Si)]

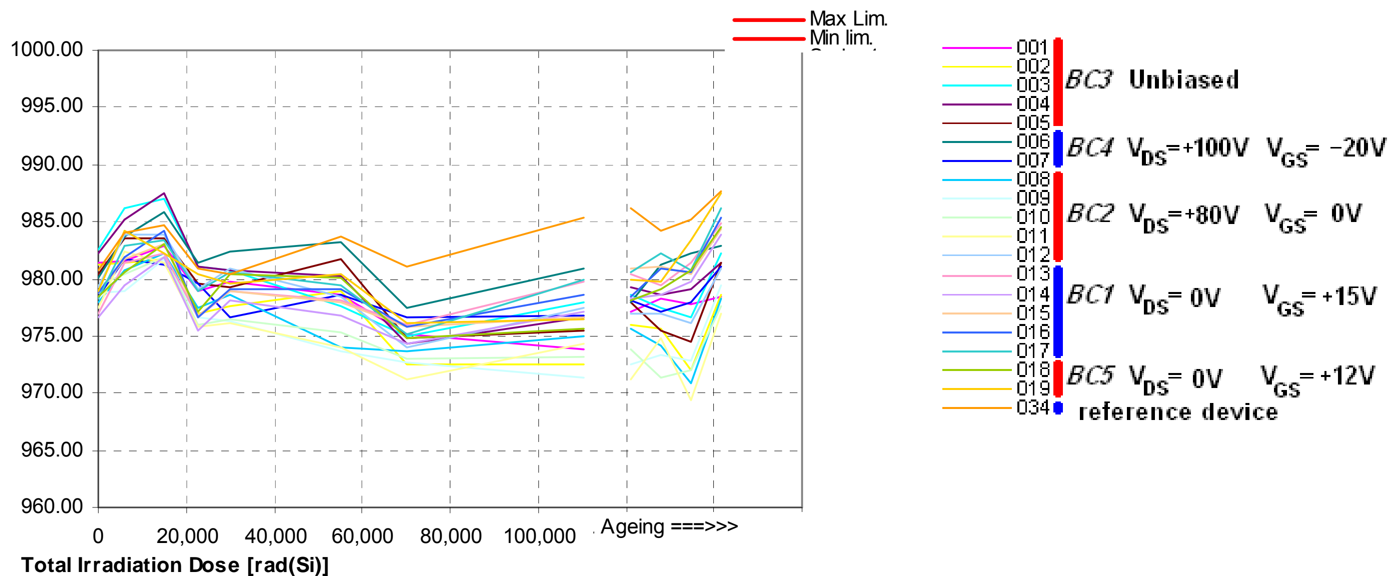


Figure 13 Data from Table 15

Table 16 – $V_{(BR)DSS}$ @I_{DS}=100uA – VDS Breakdown Voltage [V] vs ^{60}Co Irradiation Total Dose [rad (Si)]

STRH8N10STF3	Min.	Max.	Unit
Applicable limits:	100		[V]

Detailed results - Measurement data in [V]

s/n	0	6'197	15'000	22'500	30'062	55'000	70'067	110'500	Annealing 6hrs RT	Annealing 21hrs RT	Annealing 139hrs RT	Ageing 168hrs 100'C	Applied Bias Condition
001	132.945	132.056	131.156	131.010	129.956	130.804	128.419	127.031	126.829	127.020	126.844	125.843	(V_{DS} 0V, V_{GS} 0V)
002	133.691	133.192	132.113	132.311	131.254	129.356	129.105	127.736	126.938	127.245	127.624	126.683	(V_{DS} 0V, V_{GS} 0V)
003	134.025	132.859	131.749	131.925	132.484	130.286	129.784	128.273	127.991	128.254	128.407	127.028	(V_{DS} 0V, V_{GS} 0V)
004	132.724	131.873	130.665	129.919	130.181	128.224	127.845	126.780	127.009	126.765	126.776	125.306	(V_{DS} 0V, V_{GS} 0V)
005	134.329	132.626	131.591	131.344	131.512	129.341	128.948	127.665	127.245	127.830	127.575	126.435	(V_{DS} 0V, V_{GS} 0V)
006	137.603	134.044	134.876	134.764	135.143	132.735	132.330	130.725	130.597	130.676	131.700	132.484	(V_{DS} +100V, V_{GS} -20V)
007	134.167	134.636	132.000	133.320	134.171	130.815	131.614	129.607	129.289	129.311	129.038	130.688	(V_{DS} +100V, V_{GS} -20V)
008	132.188	131.242	130.669	130.958	131.029	128.798	128.591	127.474	127.290	127.474	127.496	128.546	(V_{DS} +80V, V_{GS} 0V)
009	134.276	133.493	133.890	133.984	131.681	130.778	130.294	128.167	128.985	128.017	128.096	131.422	(V_{DS} +80V, V_{GS} 0V)
010	133.545	133.860	132.829	132.630	131.415	130.680	130.425	128.572	128.333	129.007	128.711	130.196	(V_{DS} +80V, V_{GS} 0V)
011	133.673	134.542	131.550	131.933	132.127	130.748	130.072	128.775	128.663	128.340	130.549	131.453	(V_{DS} +80V, V_{GS} 0V)
012	134.040	132.608	131.482	132.240	131.235	130.178	129.915	128.505	128.374	128.216	128.280	130.324	(V_{DS} +80V, V_{GS} 0V)
013	132.251	131.798	125.644	123.773	121.957	115.680	112.601	105.907	106.463	107.014	108.319	119.681	(V_{DS} 0V, V_{GS} +15V)
014	133.688	133.541	126.517	124.763	122.831	116.749	114.030	107.561	108.004	108.510	109.894	121.429	(V_{DS} 0V, V_{GS} +15V)
015	132.405	129.626	125.966	124.046	122.261	115.414	112.714	106.001	106.215	106.939	108.135	120.071	(V_{DS} 0V, V_{GS} +15V)
016	133.335	129.469	126.000	124.309	121.871	116.063	112.976	106.718	106.875	107.584	108.896	120.630	(V_{DS} 0V, V_{GS} +15V)
017	132.000	130.189	125.434	124.031	121.808	115.140	113.055	105.731	106.582	107.085	108.784	119.760	(V_{DS} 0V, V_{GS} +15V)
018	135.034	130.507	127.624	125.659	122.827	116.809	114.251	107.513	107.940	108.626	109.916	121.282	(V_{DS} 0V, V_{GS} +12V)
019	133.875	131.002	127.444	125.265	123.450	116.381	113.884	107.318	109.583	108.248	109.414	120.784	(V_{DS} 0V, V_{GS} +12V)
034	133.489	133.249	133.493	133.916	134.077	133.676	134.314	133.065	133.639	135.251	132.964	133.459	Reference device

Reference device **Mean value:** 133.72 **Estimated uncertainty:** ± 0.4 % (± 0.54 V)

Red values: greater than max limit
Dark red Values: lower than min limits

STRH8N10STF3 Applicable limits:	*Min.*	*Max.*	*Unit*
	100		[V]

$V_{(BR)DSS}$ @I_{DS}=100uA – VDS Breakdown Voltage [V] vs ^{60}Co Irradiation Total Dose [rad (Si)]

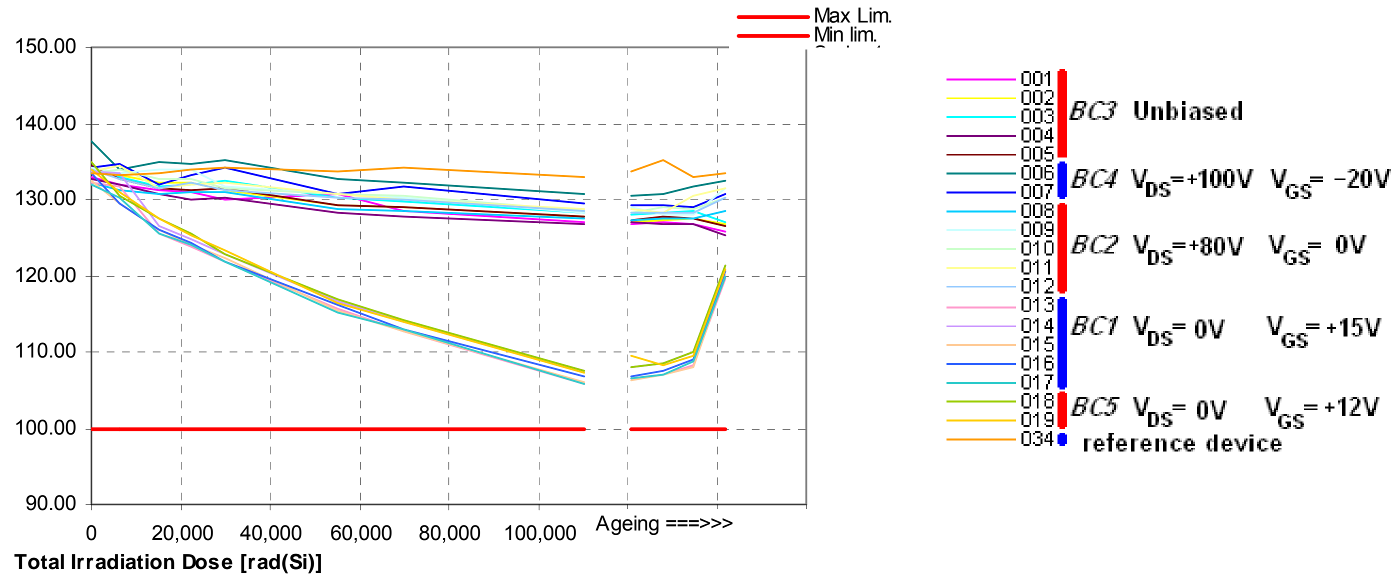


Figure 14 Data from Table 16

Table 17 – $V_{(BR)DSS}$ @I_{DS}=250uA – VDS Breakdown Voltage [V] vs ^{60}Co Irradiation Total Dose [rad (Si)]

STRH8N10STF3 Applicable limits:	Min.	Max.	Unit
	100		[V]

Detailed results - Measurement data in [V]

s/n	0	6'197	15'000	22'500	30'062	55'000	70'067	110'500	Annealing 6hrs RT	Annealing 21hrs RT	Annealing 139hrs RT	Ageing 168hrs 100'C	Applied Bias Condition
001	134.445	134.021	133.185	133.009	131.670	130.155	130.500	128.426	127.943	128.167	128.737	126.495	(V_{DS} 0V, V_{GS} 0V)
002	134.644	133.755	132.416	132.577	131.520	130.507	130.151	128.588	128.452	128.516	128.535	126.840	(V_{DS} 0V, V_{GS} 0V)
003	135.611	135.109	133.519	133.860	132.877	131.351	130.939	129.998	129.244	129.604	129.735	127.481	(V_{DS} 0V, V_{GS} 0V)
004	134.573	133.387	132.176	131.171	130.718	129.394	129.229	127.785	127.440	127.500	127.586	126.180	(V_{DS} 0V, V_{GS} 0V)
005	134.719	133.541	132.608	132.656	132.266	130.282	130.290	128.884	128.663	129.127	129.116	127.350	(V_{DS} 0V, V_{GS} 0V)
006	137.246	135.971	136.061	135.352	134.760	133.841	134.141	132.705	131.846	132.188	132.292	133.144	(V_{DS} +100V, V_{GS} -20V)
007	134.944	134.468	134.066	133.890	133.271	132.056	132.300	130.361	130.256	130.373	130.481	131.606	(V_{DS} +100V, V_{GS} -20V)
008	133.380	133.114	131.618	131.929	131.216	129.982	129.990	128.452	128.194	128.775	128.591	129.750	(V_{DS} +80V, V_{GS} 0V)
009	134.610	133.695	132.983	132.735	131.933	131.370	131.419	128.903	129.323	129.229	129.645	130.714	(V_{DS} +80V, V_{GS} 0V)
010	134.629	133.710	132.810	133.354	132.724	131.692	131.321	130.009	129.165	129.743	129.806	131.648	(V_{DS} +80V, V_{GS} 0V)
011	134.816	135.784	133.046	133.759	132.311	131.344	130.673	129.641	129.956	129.825	129.941	130.612	(V_{DS} +80V, V_{GS} 0V)
012	134.644	133.567	132.555	132.847	131.917	131.025	131.081	129.585	129.825	129.784	129.675	130.706	(V_{DS} +80V, V_{GS} 0V)
013	134.524	130.496	126.274	124.339	122.666	116.494	113.861	108.296	108.829	109.129	110.186	121.905	(V_{DS} 0V, V_{GS} +15V)
014	134.505	131.846	126.368	125.400	123.345	117.248	114.608	108.690	108.907	109.579	111.172	122.490	(V_{DS} 0V, V_{GS} +15V)
015	133.504	131.010	126.570	124.853	122.434	116.513	113.726	108.038	108.705	108.686	110.438	121.969	(V_{DS} 0V, V_{GS} +15V)
016	134.175	131.044	126.105	124.913	122.861	117.401	114.427	107.944	109.144	109.380	111.049	122.872	(V_{DS} 0V, V_{GS} +15V)
017	133.627	130.684	126.532	124.046	122.194	115.867	113.524	107.276	107.861	108.075	110.602	121.459	(V_{DS} 0V, V_{GS} +15V)
018	134.831	132.004	128.370	126.142	123.266	117.112	114.870	109.039	109.039	109.837	111.315	122.835	(V_{DS} 0V, V_{GS} +12V)
019	134.554	132.218	127.650	125.771	123.776	117.030	114.848	108.784	108.649	109.909	110.869	122.693	(V_{DS} 0V, V_{GS} +12V)
034	134.651	134.197	134.738	134.741	135.548	134.156	135.859	133.928	134.239	134.224	134.925	133.759	Reference device

Reference device **Mean value:** **134.58** **Estimated uncertainty:** **± 0.41 % (± 0.55 V)**

Red values: greater than max limit
Dark red Values: lower than min limits

STRH8N10STF3	*Min.*	*Max.*	*Unit*
Applicable limits:	100		[V]

$V_{(BR)DSS}$ @I_{DS}=250uA – VDS Breakdown Voltage [V] vs ^{60}Co Irradiation Total Dose [rad (Si)]

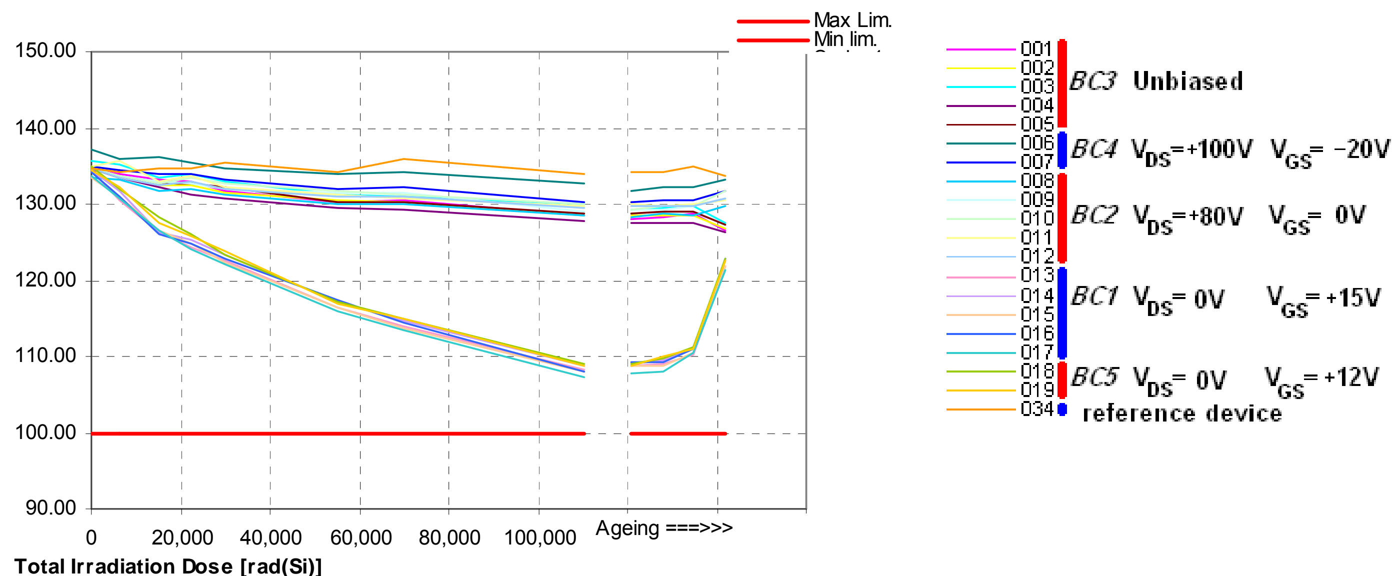


Figure 15 Data from Table 17

Table 18 – $V_{(BR)DSS}$ @I_{DS}= 1 mA – VDS Breakdown Voltage [V] vs ^{60}Co Irradiation Total Dose [rad (Si)]

STRH8N10STF3	*Min.*	*Max.*	*Unit*
Applicable limits:	100		[V]

Detailed results - Measurement data in [V]

s/n	0	6'197	15'000	22'500	30'062	55'000	70'067	110'500	Annealing 6hrs RT	Annealing 21hrs RT	Annealing 139hrs RT	Ageing 168hrs 100'C	Applied Bias Condition
001	137.224	136.129	134.797	134.438	133.961	132.023	131.861	130.373	129.889	130.373	130.654	128.126	(V_{DS} 0V, V_{GS} 0V)
002	137.299	136.463	135.191	134.850	134.145	132.615	132.371	131.066	130.627	130.620	130.631	128.164	(V_{DS} 0V, V_{GS} 0V)
003	138.071	136.785	135.649	135.664	134.955	133.387	132.863	131.659	131.351	131.456	131.839	129.244	(V_{DS} 0V, V_{GS} 0V)
004	136.144	135.079	133.864	133.631	132.626	131.280	130.913	129.806	129.502	129.720	129.799	127.429	(V_{DS} 0V, V_{GS} 0V)
005	137.816	136.395	135.371	135.262	134.366	132.709	132.401	131.047	130.624	131.040	131.085	128.678	(V_{DS} 0V, V_{GS} 0V)
006	138.379	137.558	137.306	137.715	137.250	136.166	136.080	134.400	134.393	134.288	134.678	135.720	(V_{DS} +100V, V_{GS} -20V)
007	137.528	136.493	136.147	136.151	136.058	135.008	134.588	133.121	132.851	132.941	132.926	134.602	(V_{DS} +100V, V_{GS} -20V)
008	135.915	134.996	134.048	134.040	133.061	132.053	131.419	130.148	129.994	130.504	130.376	131.505	(V_{DS} +80V, V_{GS} 0V)
009	137.407	136.110	135.229	134.828	134.123	132.922	132.713	131.224	131.224	131.422	131.100	132.724	(V_{DS} +80V, V_{GS} 0V)
010	137.498	136.343	135.210	135.191	134.336	133.301	132.671	131.332	131.377	131.224	131.273	132.446	(V_{DS} +80V, V_{GS} 0V)
011	137.869	136.526	135.585	135.578	134.648	133.399	132.941	131.381	131.730	131.520	131.651	133.009	(V_{DS} +80V, V_{GS} 0V)
012	137.126	135.960	134.839	134.910	134.295	132.765	132.555	131.370	131.389	131.171	131.070	132.368	(V_{DS} +80V, V_{GS} 0V)
013	135.844	132.803	126.705	124.680	124.234	118.530	116.243	110.085	110.704	111.094	112.556	124.500	(V_{DS} 0V, V_{GS} +15V)
014	136.778	133.853	127.110	125.486	124.740	119.070	116.633	111.281	111.210	111.757	113.441	125.269	(V_{DS} 0V, V_{GS} +15V)
015	136.399	133.095	126.889	125.280	124.388	118.192	115.635	110.512	110.520	111.045	112.477	124.545	(V_{DS} 0V, V_{GS} +15V)
016	136.009	133.282	126.728	125.790	124.373	119.201	116.434	110.722	111.300	111.529	113.029	125.021	(V_{DS} 0V, V_{GS} +15V)
017	136.208	132.619	126.660	125.066	124.039	118.301	115.616	110.213	110.194	110.692	112.324	124.027	(V_{DS} 0V, V_{GS} +15V)
018	137.055	134.239	129.289	127.440	125.621	119.254	117.154	111.458	111.532	112.099	113.591	125.393	(V_{DS} 0V, V_{GS} +12V)
019	137.595	134.074	127.867	126.195	125.100	119.014	117.000	110.970	111.323	111.930	112.920	124.496	(V_{DS} 0V, V_{GS} +12V)
034	137.445	136.579	136.534	137.355	136.725	136.613	137.329	136.496	136.358	136.594	136.594	136.151	Reference device

Reference device **Mean value:** 136.73 **Estimated uncertainty:** ± 0.26 % (± 0.36 V)

Red values: greater than max limit
Dark red Values: lower than min limits

STRH8N10STF3 Applicable limits:	Min.	Max.	Unit
	100		[V]

$V_{(BR)DSS}$ @I_{DS}= 1mA – VDS Breakdown Voltage [V] vs ^{60}Co Irradiation Total Dose [rad (Si)]

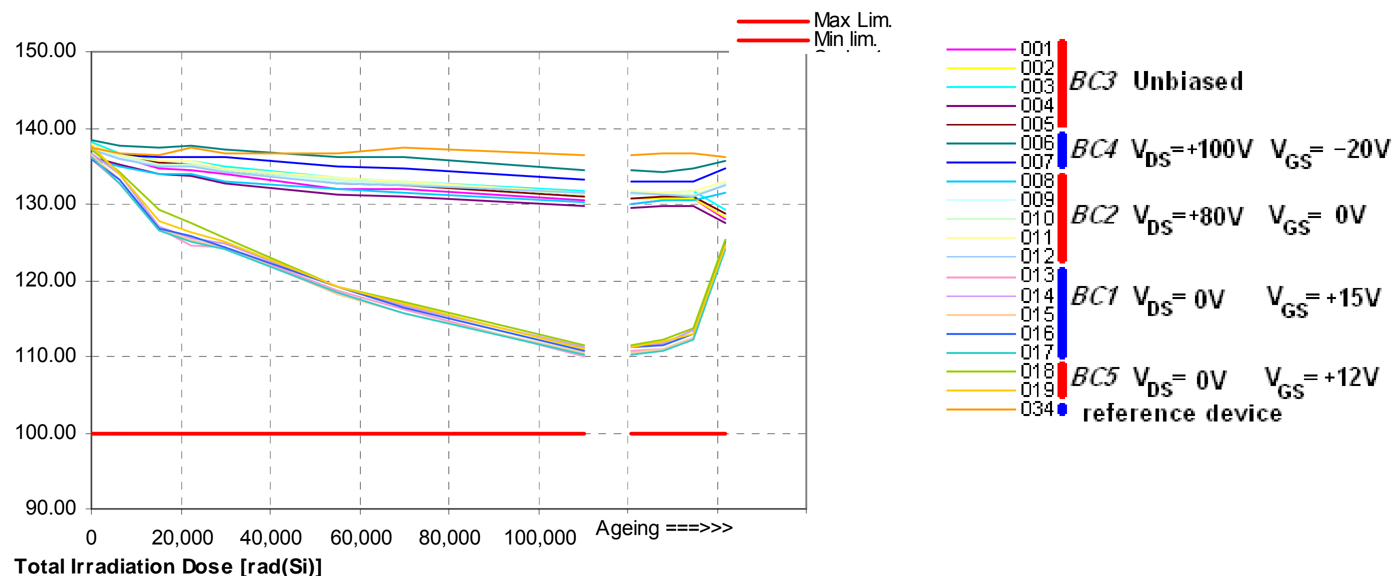


Figure 16 Data from Table 18

Table 19 – V_{DS}(on) Drain-Source On Voltage [mV] vs ^{60}Co Irradiation Total Dose [rad (Si)]

STRH8N10STF3	Min.	Max.	Unit
Applicable limits:	-	800	[mV]

Detailed results - Measurement data in [mV]

s/n	0	6'197	15'000	22'500	30'062	55'000	70'067	110'500	Annealing 6hrs RT	Annealing 21hrs RT	Annealing 139hrs RT	Ageing 168hrs 100'C	Applied Bias Condition
001	973.625	962.688	941.250	974.063	963.313	951.375	977.000	965.063	948.063	951.000	940.938	924.250	(V_{DS} 0V, V_{GS} 0V)
002	971.688	959.688	950.750	980.563	971.500	968.188	981.938	971.688	952.125	960.813	956.000	931.125	(V_{DS} 0V, V_{GS} 0V)
003	966.313	948.250	944.563	972.688	962.438	964.563	980.188	970.563	945.750	956.125	947.500	934.938	(V_{DS} 0V, V_{GS} 0V)
004	970.250	941.000	941.188	969.813	964.438	945.313	972.188	966.250	941.875	954.063	950.125	925.750	(V_{DS} 0V, V_{GS} 0V)
005	969.813	945.688	940.500	975.438	976.625	961.688	979.313	972.313	949.063	957.625	955.813	927.000	(V_{DS} 0V, V_{GS} 0V)
006	973.000	952.938	949.500	976.000	969.438	953.188	974.875	956.563	940.688	945.750	950.875	929.375	(V_{DS} +100V, V_{GS} -20V)
007	974.188	944.125	947.375	967.563	964.813	958.750	978.688	955.063	945.938	945.188	935.250	935.875	(V_{DS} +100V, V_{GS} -20V)
008	986.625	962.188	953.000	988.063	969.063	982.938	985.063	963.375	961.500	955.000	963.188	942.188	(V_{DS} +80V, V_{GS} 0V)
009	984.375	953.813	953.250	973.313	971.688	964.313	983.125	956.750	947.125	945.813	950.875	931.875	(V_{DS} +80V, V_{GS} 0V)
010	976.375	956.938	944.063	978.188	957.000	955.750	972.875	957.063	939.438	938.500	951.063	930.000	(V_{DS} +80V, V_{GS} 0V)
011	977.625	952.813	949.563	969.813	965.625	960.188	979.063	948.688	941.688	943.813	939.563	926.938	(V_{DS} +80V, V_{GS} 0V)
012	977.813	950.438	952.688	974.750	968.688	956.563	972.625	955.500	945.813	942.063	955.063	933.500	(V_{DS} +80V, V_{GS} 0V)
013	996.813	960.813	952.750	980.375	969.563	979.938	990.063	968.563	959.000	954.688	970.000	977.313	(V_{DS} 0V, V_{GS} +15V)
014	980.813	946.125	943.938	976.688	951.188	962.813	977.813	967.875	948.500	951.500	954.000	972.000	(V_{DS} 0V, V_{GS} +15V)
015	979.000	953.313	947.500	988.375	964.188	961.625	985.250	962.000	961.813	961.688	963.625	980.875	(V_{DS} 0V, V_{GS} +15V)
016	988.250	962.875	961.125	993.688	972.563	977.188	991.250	980.500	967.875	968.750	968.250	987.813	(V_{DS} 0V, V_{GS} +15V)
017	981.875	952.813	951.250	985.688	969.688	967.875	977.938	962.625	956.500	949.875	967.875	978.938	(V_{DS} 0V, V_{GS} +15V)
018	976.250	943.563	944.063	979.938	957.813	960.938	979.938	963.250	945.688	952.438	952.375	977.000	(V_{DS} 0V, V_{GS} +12V)
019	984.313	956.750	943.500	965.688	966.000	945.313	972.500	955.438	953.563	946.313	950.750	964.750	(V_{DS} 0V, V_{GS} +12V)
034	985.875	949.813	957.250	992.688	980.375	957.375	977.063	946.938	950.375	960.813	951.938	946.000	Reference device

Reference device **Mean value:** 963.042 **Estimated uncertainty:** ± 1.48 % (± 14.25 mV)

Red values: greater than max limit
Dark red Values: lower than min limits

Note: *the observed out of max limits are not accounted as failure since (due to test equipment limitation) the applied Test Conditions deviate from Manufacturer Test Conditions Log HGOC.tst, dated 09.09.2009, while the maximum limit there specified was still maintained.*
The parameter was measured to monitor its TID sensitivity.

STRH8N10STF3 Applicable limits:	*Min.*	*Max.*	*Unit*
	-	800	[mV]

V_{DS}(on) Drain-Source On Voltage [mV] vs ^{60}Co Irradiation Total Dose [rad (Si)]

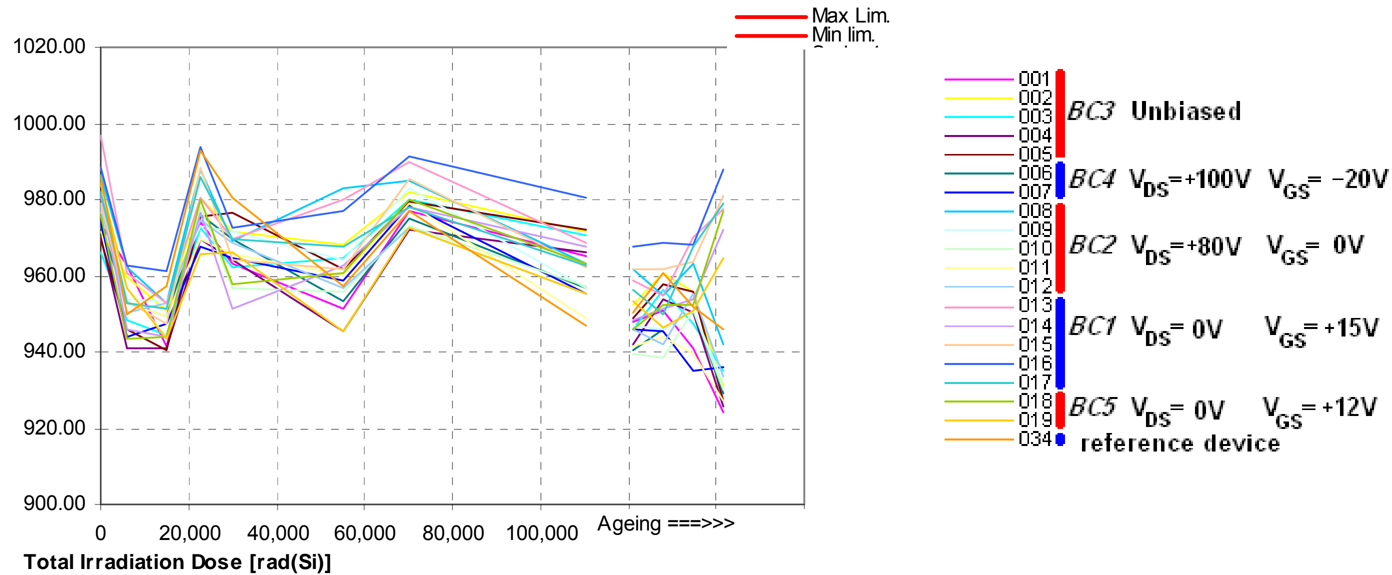


Figure 17 Data from Table 19

Due to test equipment limitation, the following deviation from Detail Spec. Test condition, have been applied:

Required test conditions	Actual Test conditions
I_{DS} = 4A V_{GS} = 12 V	I_{DS} = 4A V_{GS} = 10 V

Table 20 – I_{DS}(on) Drain-Source On Current [A] vs ^{60}Co Irradiation Total Dose [rad (Si)]

STRH8N10STF3 Applicable limits:	*Min.*	*Max.*	*Unit*
	8		[A]

Detailed results - Measurement data in [A]

s/n	0	6'197	15'000	22'500	30'062	55'000	70'067	110'500	Annealing 6hrs RT	Annealing 21hrs RT	Annealing 139hrs RT	Ageing 168hrs 100'C	Applied Bias Condition
001	25.419	25.549	25.809	25.384	25.591	25.579	25.329	25.381	25.720	25.569	25.749	26.076	(V_{DS} 0V, V_{GS} 0V)
002	25.410	25.602	25.762	25.331	25.410	25.510	25.299	25.256	25.644	25.468	25.547	25.984	(V_{DS} 0V, V_{GS} 0V)
003	25.378	25.745	25.793	25.401	25.506	25.558	25.302	25.441	25.651	25.629	25.591	25.984	(V_{DS} 0V, V_{GS} 0V)
004	25.652	25.927	26.093	25.575	25.778	25.853	25.524	25.539	25.926	25.813	25.920	26.267	(V_{DS} 0V, V_{GS} 0V)
005	25.366	25.711	25.817	25.412	25.407	25.659	25.315	25.393	25.741	25.489	25.558	26.042	(V_{DS} 0V, V_{GS} 0V)
006	25.267	25.562	25.644	25.264	25.371	25.591	25.277	25.505	25.703	25.682	25.644	25.937	(V_{DS} +100V, V_{GS} -20V)
007	25.304	25.794	25.805	25.402	25.474	25.656	25.337	25.641	25.817	25.805	25.831	26.087	(V_{DS} +100V, V_{GS} -20V)
008	25.355	25.711	25.832	25.412	25.595	25.593	25.431	25.706	25.799	25.944	25.827	26.121	(V_{DS} +80V, V_{GS} 0V)
009	25.249	25.655	25.768	25.330	25.504	25.520	25.412	25.703	25.752	25.754	25.817	26.061	(V_{DS} +80V, V_{GS} 0V)
010	25.416	25.757	25.817	25.279	25.549	25.593	25.447	25.723	25.804	25.797	25.855	26.094	(V_{DS} +80V, V_{GS} 0V)
011	25.324	25.762	25.792	25.336	25.504	25.651	25.452	25.647	25.797	25.881	25.796	26.124	(V_{DS} +80V, V_{GS} 0V)
012	25.334	25.758	25.858	25.403	25.587	25.668	25.449	25.712	25.853	25.875	25.784	26.129	(V_{DS} +80V, V_{GS} 0V)
013	25.310	25.858	25.850	25.419	25.585	25.596	25.369	25.677	25.689	25.726	25.638	25.103	(V_{DS} 0V, V_{GS} +15V)
014	25.379	25.912	25.966	25.476	25.692	25.650	25.478	25.630	25.857	25.818	25.710	25.241	(V_{DS} 0V, V_{GS} +15V)
015	25.289	25.754	25.841	25.389	25.584	25.600	25.371	25.576	25.666	25.636	25.615	25.078	(V_{DS} 0V, V_{GS} +15V)
016	25.333	25.749	25.844	25.273	25.604	25.571	25.339	25.521	25.678	25.660	25.473	25.089	(V_{DS} 0V, V_{GS} +15V)
017	25.268	25.816	25.900	25.361	25.584	25.623	25.421	25.724	25.756	25.724	25.523	25.164	(V_{DS} 0V, V_{GS} +15V)
018	25.297	25.791	25.871	25.405	25.621	25.736	25.317	25.634	25.765	25.750	25.699	25.231	(V_{DS} 0V, V_{GS} +12V)
019	25.208	25.779	25.864	25.453	25.578	25.773	25.336	25.662	25.818	25.787	25.693	25.297	(V_{DS} 0V, V_{GS} +12V)
034	25.261	25.717	25.728	25.260	25.396	25.626	25.310	25.729	25.849	25.694	25.810	25.979	Reference device

Reference device **Mean value:** 25.613 **Estimated uncertainty:** ± 0.83 % (± 0.212 A)

Red values: greater than max limit
Dark red Values: lower than min limits

STRH8N10STF3 Applicable limits:	Min.	Max.	Unit
	8		[A]

I_{DS}(on) Drain-Source On Current [A] vs ^{60}Co Irradiation Total Dose [rad (Si)]

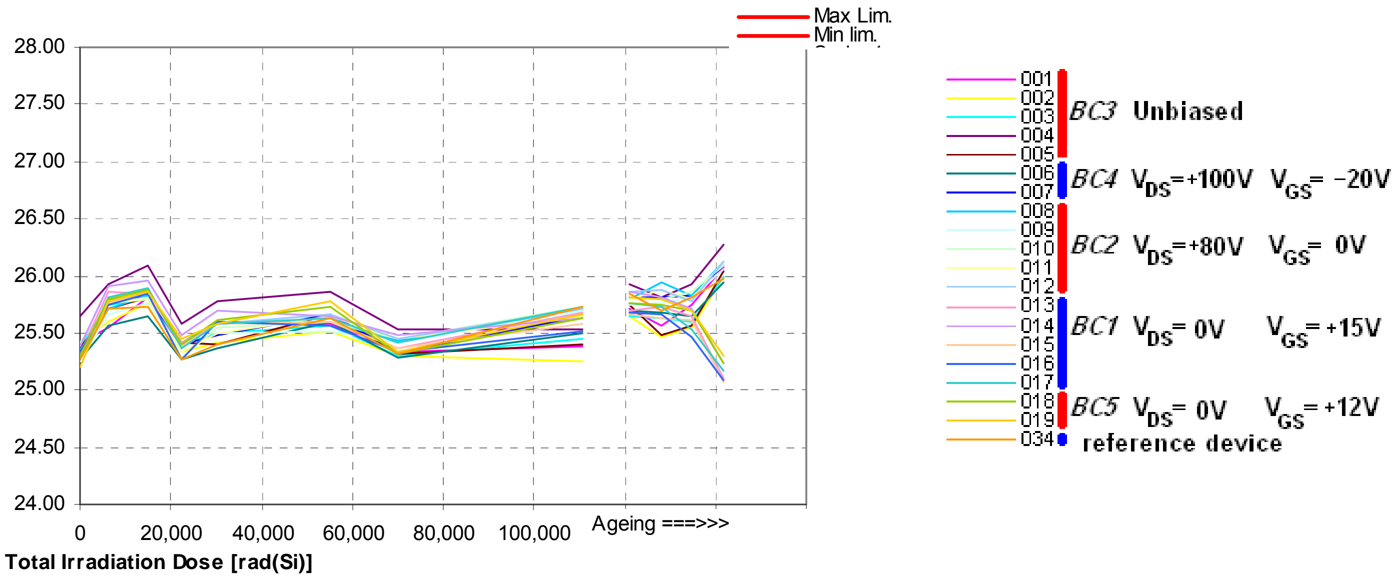


Figure 18 Data from Table 20

Table 21 – Qg Total Gate Charge [nCoulomb] vs ^{60}Co Irradiation Total Dose [rad (Si)]:

STRH8N10STF3	Min.	Max.	Unit
Applicable limits:	n.d.	n.d.	[nC]

Detailed results - Measurement data in [nC]

s/n	0	6'197	15'000	22'500	30'062	55'000	70'067	110'500	Annealing 6hrs RT	Annealing 21hrs RT	Annealing 139hrs RT	Ageing 168hrs 100'C	Applied Bias Condition
001	23.330	23.459	23.697	23.997	24.030	24.301	24.666	24.995	24.958	24.831	24.692	23.894	(V_{DS} 0V, V_{GS} 0V)
002	23.421	23.470	23.798	24.079	24.107	24.389	24.756	25.084	25.048	24.919	24.783	23.968	(V_{DS} 0V, V_{GS} 0V)
003	23.537	23.623	23.918	24.206	24.243	24.525	24.870	25.202	25.162	25.020	24.903	24.080	(V_{DS} 0V, V_{GS} 0V)
004	23.408	23.455	23.745	24.034	24.054	24.332	24.693	25.029	24.990	24.859	24.732	23.925	(V_{DS} 0V, V_{GS} 0V)
005	23.464	23.512	23.817	24.091	24.115	24.395	24.749	25.092	25.056	24.925	24.793	23.979	(V_{DS} 0V, V_{GS} 0V)
006	23.408	23.548	23.806	24.040	24.058	24.316	24.664	25.094	25.064	24.964	24.881	24.488	(V_{DS} +100V, V_{GS} -20V)
007	23.456	23.775	23.834	24.070	24.087	24.354	24.719	25.141	25.108	24.992	24.913	24.488	(V_{DS} +100V, V_{GS} -20V)
008	23.647	23.873	24.054	24.283	24.273	24.473	24.807	25.131	25.096	24.972	24.907	24.382	(V_{DS} +80V, V_{GS} 0V)
009	23.478	23.686	23.895	24.136	24.115	24.318	24.630	24.957	24.922	24.798	24.730	24.219	(V_{DS} +80V, V_{GS} 0V)
010	23.495	23.676	23.907	24.139	24.124	24.331	24.651	24.984	24.946	24.816	24.751	24.256	(V_{DS} +80V, V_{GS} 0V)
011	23.493	23.680	23.935	24.159	24.130	24.351	24.657	24.980	24.948	24.834	24.753	24.264	(V_{DS} +80V, V_{GS} 0V)
012	23.527	23.707	23.943	24.188	24.151	24.374	24.670	24.995	24.962	24.850	24.778	24.281	(V_{DS} +80V, V_{GS} 0V)
013	23.686	24.406	25.461	26.247	26.755	28.519	29.611	31.575	31.474	31.117	30.679	26.971	(V_{DS} 0V, V_{GS} +15V)
014	23.528	24.462	25.319	26.072	26.605	28.372	29.437	31.397	31.310	31.010	30.388	26.797	(V_{DS} 0V, V_{GS} +15V)
015	23.357	24.304	25.166	25.926	26.450	28.209	29.293	31.239	31.142	30.801	30.257	26.672	(V_{DS} 0V, V_{GS} +15V)
016	23.623	24.486	25.398	26.150	26.656	28.429	29.494	31.452	31.350	30.995	30.469	26.871	(V_{DS} 0V, V_{GS} +15V)
017	23.353	24.278	25.127	25.904	26.374	28.189	29.243	31.213	31.120	30.793	30.229	26.804	(V_{DS} 0V, V_{GS} +15V)
018	23.555	24.487	25.364	26.135	26.615	28.464	29.544	31.542	31.444	31.098	30.679	26.944	(V_{DS} 0V, V_{GS} +12V)
019	23.523	24.461	25.318	26.104	26.596	28.434	29.496	31.536	31.448	31.137	30.612	27.107	(V_{DS} 0V, V_{GS} +12V)
034	23.541	23.481	23.389	23.514	23.405	23.341	23.569	23.545	23.512	23.396	23.394	23.470	Reference device

Reference device **Mean value:** 23.46 **Estimated uncertainty:** ± 0.28 % (± 0.07 nC)

Red values: greater than max limit
Dark red Values: lower than min limits

STRH8N10STF3 Applicable limits:	*Min.*	*Max.*	*Unit*
	n.d.	n.d.	[nC]

Qg Total Gate Charge [nCoulomb] vs ^{60}Co Irradiation Total Dose [rad (Si)]

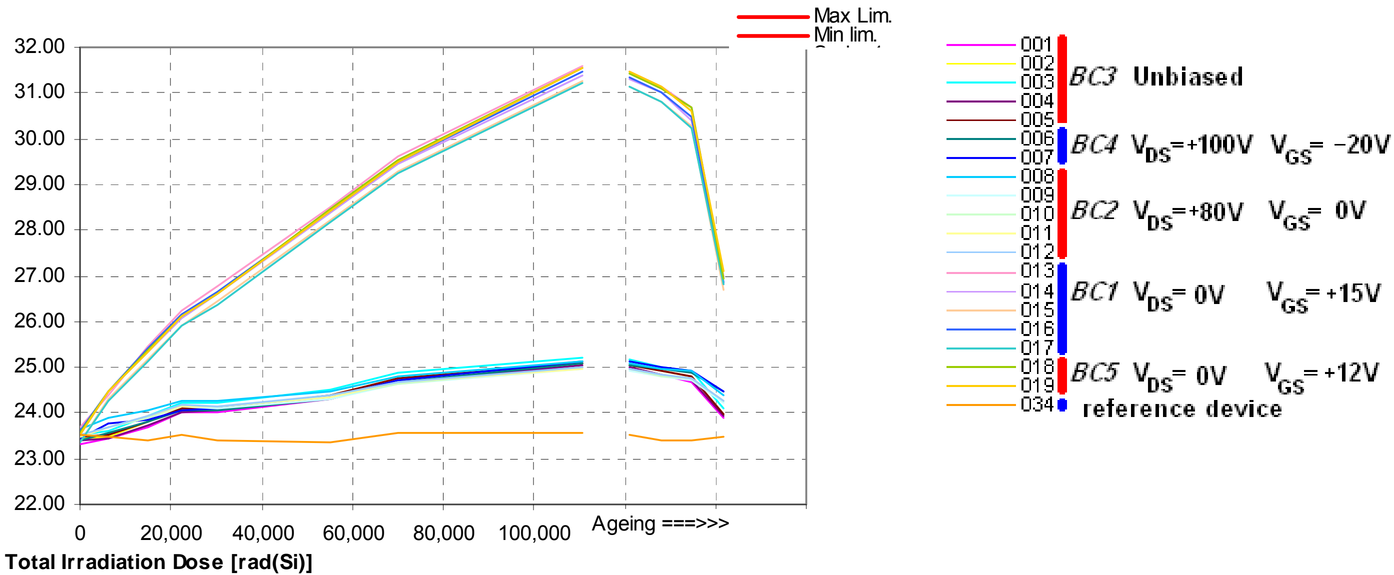


Figure 19 Data from Table 21

Table 22 – Qgs Gate Source Charge [nCoulomb] vs ^{60}Co Irradiation Total Dose [rad (Si)]:

STRH8N10STF3 Applicable limits:	*Min.*	*Max.*	*Unit*
	n.d.	n.d.	[nC]

Detailed results - Measurement data in [nC]

s/n	0	6'197	15'000	22'500	30'062	55'000	70'067	110'500	Annealing 6hrs RT	Annealing 21hrs RT	Annealing 139hrs RT	Ageing 168hrs 100'C	Applied Bias Condition
001	5.596	5.415	5.175	5.074	4.908	4.458	4.298	4.002	4.000	3.993	3.961	4.509	(V_{DS} 0V, V_{GS} 0V)
002	5.617	5.429	5.189	5.039	4.876	4.450	4.292	3.980	3.980	3.985	3.944	4.536	(V_{DS} 0V, V_{GS} 0V)
003	5.593	5.395	5.157	4.987	4.849	4.434	4.283	3.999	3.986	3.944	3.920	4.504	(V_{DS} 0V, V_{GS} 0V)
004	5.605	5.416	5.165	5.009	4.865	4.410	4.277	3.974	3.972	3.966	3.964	4.505	(V_{DS} 0V, V_{GS} 0V)
005	5.604	5.597	5.170	5.005	4.852	4.418	4.284	3.986	3.980	3.963	3.950	4.467	(V_{DS} 0V, V_{GS} 0V)
006	5.718	5.549	5.516	5.452	5.362	5.062	4.930	4.554	4.554	4.558	4.640	5.071	(V_{DS} +100V, V_{GS} -20V)
007	5.617	5.533	5.434	5.349	5.280	5.023	4.889	4.542	4.536	4.510	4.563	4.998	(V_{DS} +100V, V_{GS} -20V)
008	5.712	5.536	5.307	5.130	4.985	4.509	4.351	4.006	4.006	4.005	3.921	4.728	(V_{DS} +80V, V_{GS} 0V)
009	5.649	5.476	5.260	5.098	4.899	4.461	4.314	3.970	3.954	3.895	3.892	4.643	(V_{DS} +80V, V_{GS} 0V)
010	5.642	5.450	5.240	5.080	4.928	4.478	4.309	3.981	3.968	3.918	3.896	4.610	(V_{DS} +80V, V_{GS} 0V)
011	5.614	5.384	5.213	5.046	4.894	4.447	4.282	3.938	3.930	3.904	3.873	4.566	(V_{DS} +80V, V_{GS} 0V)
012	5.628	5.420	5.226	5.084	4.914	4.457	4.259	3.927	3.926	3.925	3.865	4.579	(V_{DS} +80V, V_{GS} 0V)
013	5.772	5.515	5.348	5.195	5.032	4.733	4.575	4.777	4.738	4.603	4.948	7.342	(V_{DS} 0V, V_{GS} +15V)
014	5.670	5.516	5.279	5.080	4.939	4.638	4.519	4.690	4.684	4.660	4.868	7.247	(V_{DS} 0V, V_{GS} +15V)
015	5.612	5.445	5.200	5.006	4.858	4.535	4.425	4.632	4.640	4.663	4.754	7.193	(V_{DS} 0V, V_{GS} +15V)
016	5.682	5.522	5.286	5.079	4.927	4.644	4.500	4.705	4.674	4.564	4.898	7.224	(V_{DS} 0V, V_{GS} +15V)
017	5.641	5.460	5.218	5.008	4.858	4.514	4.416	4.567	4.568	4.570	4.633	7.065	(V_{DS} 0V, V_{GS} +15V)
018	5.654	5.486	5.211	5.010	4.851	4.477	4.360	4.421	4.418	4.410	4.642	7.233	(V_{DS} 0V, V_{GS} +12V)
019	5.659	5.449	5.185	4.964	4.819	4.342	4.249	4.369	4.364	4.344	4.516	7.014	(V_{DS} 0V, V_{GS} +12V)
034	5.648	5.634	5.661	5.661	5.634	5.656	5.663	5.665	5.658	5.630	5.651	5.669	Reference device

Reference device **Mean value:** 5.65 **Estimated uncertainty:** ± 0.21 % (± 0.01 nC)

Red values: greater than max limit
Dark red Values: lower than min limits

STRH8N10STF3 Applicable limits:	Min.	Max.	Unit
	n.d.	n.d.	[nC]

Qgs Gate Source Charge [nCoulomb] vs ^{60}Co Irradiation Total Dose [rad (Si)]

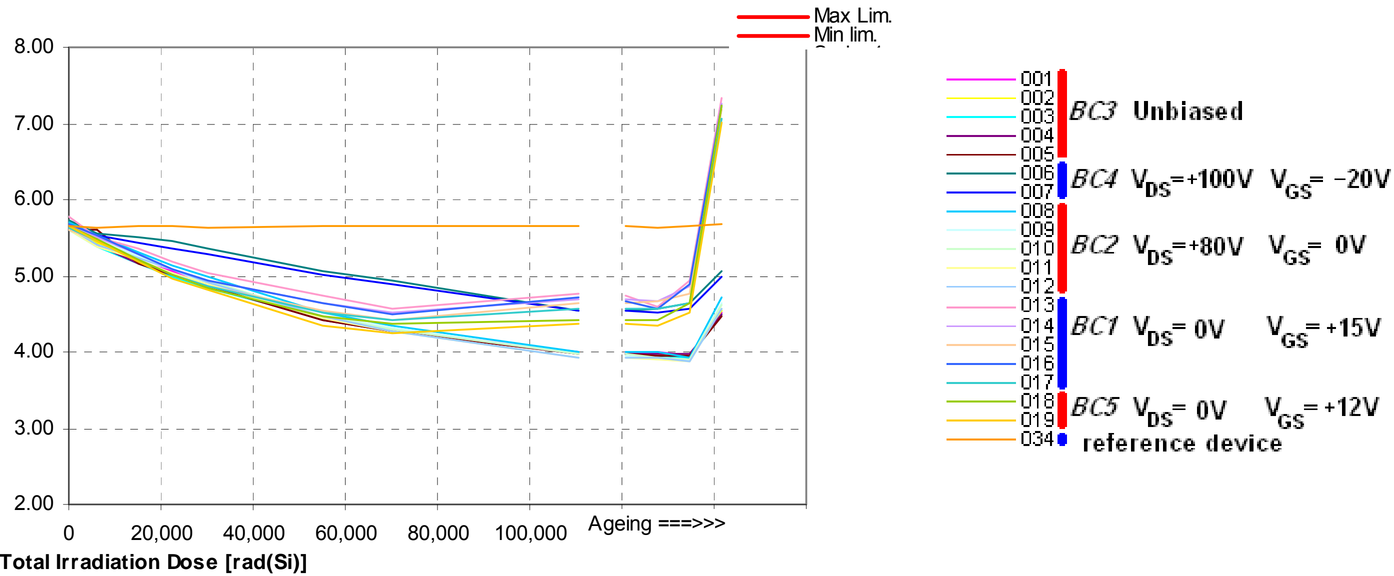


Figure 20 Data from Table 22

Table 23 – Qgd Gate Drain Charge [nCoulomb] vs ^{60}Co Irradiation Total Dose [rad (Si)]:

STRH8N10STF3	*Min.*	*Max.*	*Unit*
Applicable limits:	n.d.	n.d.	[nC]

Detailed results - Measurement data in [nC]

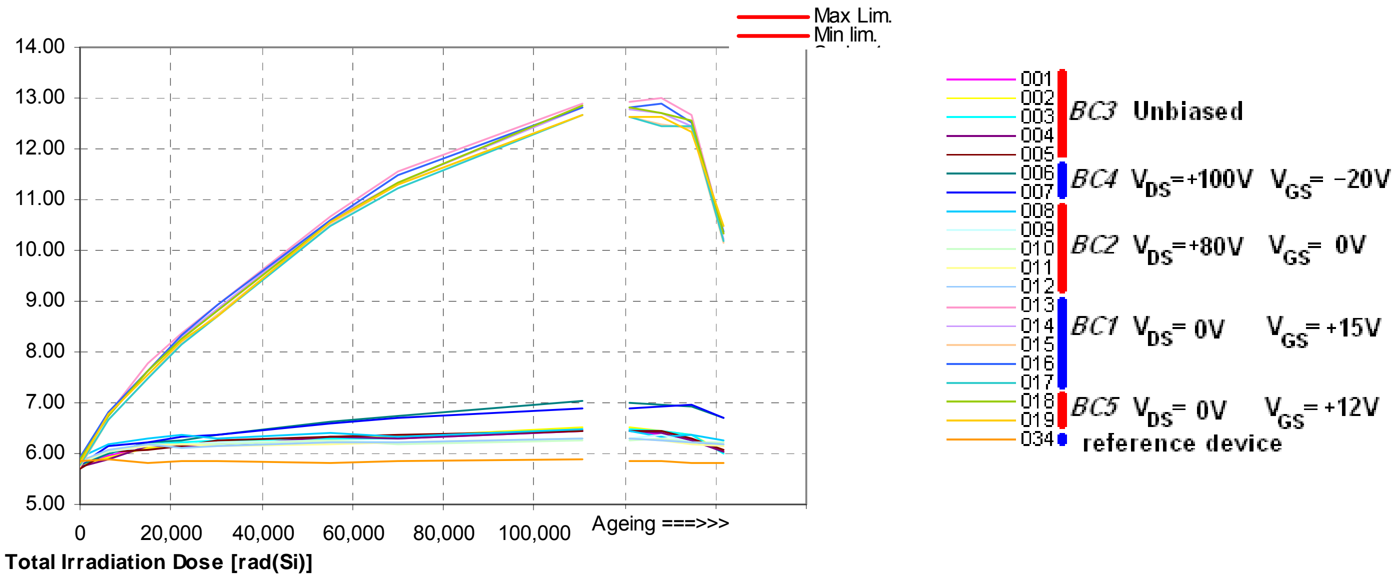
s/n	0	6'197	15'000	22'500	30'062	55'000	70'067	110'500	Annealing 6hrs RT	Annealing 21hrs RT	Annealing 139hrs RT	Ageing 168hrs 100'C	Applied Bias Condition
001	5.756	5.950	6.093	6.196	6.189	6.330	6.307	6.461	6.444	6.387	6.283	6.026	(V_{DS} 0V, V_{GS} 0V)
002	5.781	5.917	6.108	6.159	6.234	6.314	6.329	6.518	6.502	6.448	6.374	6.026	(V_{DS} 0V, V_{GS} 0V)
003	5.783	5.996	6.179	6.237	6.245	6.304	6.313	6.466	6.464	6.461	6.388	5.996	(V_{DS} 0V, V_{GS} 0V)
004	5.731	5.900	6.134	6.160	6.166	6.327	6.313	6.448	6.436	6.393	6.267	6.032	(V_{DS} 0V, V_{GS} 0V)
005	5.717	6.042	6.088	6.163	6.242	6.325	6.357	6.442	6.442	6.439	6.282	6.072	(V_{DS} 0V, V_{GS} 0V)
006	5.760	6.015	6.214	6.277	6.382	6.627	6.750	7.027	7.010	6.951	6.934	6.717	(V_{DS} +100V, V_{GS} -20V)
007	5.772	6.159	6.233	6.330	6.377	6.578	6.718	6.890	6.900	6.931	6.969	6.704	(V_{DS} +100V, V_{GS} -20V)
008	5.908	6.190	6.294	6.355	6.312	6.390	6.327	6.478	6.450	6.351	6.383	6.272	(V_{DS} +80V, V_{GS} 0V)
009	5.807	6.045	6.152	6.172	6.237	6.256	6.222	6.298	6.312	6.362	6.226	6.181	(V_{DS} +80V, V_{GS} 0V)
010	5.863	6.042	6.197	6.175	6.191	6.248	6.203	6.265	6.274	6.309	6.211	6.232	(V_{DS} +80V, V_{GS} 0V)
011	5.831	6.061	6.132	6.181	6.163	6.203	6.213	6.294	6.282	6.245	6.194	6.146	(V_{DS} +80V, V_{GS} 0V)
012	5.847	6.061	6.172	6.117	6.164	6.231	6.240	6.289	6.282	6.262	6.216	6.170	(V_{DS} +80V, V_{GS} 0V)
013	5.931	6.782	7.768	8.352	8.934	10.678	11.563	12.883	12.908	12.997	12.678	10.319	(V_{DS} 0V, V_{GS} +15V)
014	5.874	6.739	7.617	8.297	8.844	10.591	11.350	12.797	12.776	12.702	12.443	10.237	(V_{DS} 0V, V_{GS} +15V)
015	5.751	6.657	7.495	8.182	8.756	10.504	11.305	12.672	12.628	12.472	12.406	10.130	(V_{DS} 0V, V_{GS} +15V)
016	5.909	6.813	7.647	8.338	8.937	10.607	11.482	12.812	12.826	12.873	12.523	10.385	(V_{DS} 0V, V_{GS} +15V)
017	5.764	6.673	7.497	8.139	8.711	10.476	11.208	12.663	12.614	12.445	12.459	10.192	(V_{DS} 0V, V_{GS} +15V)
018	5.895	6.744	7.614	8.246	8.818	10.553	11.325	12.852	12.820	12.709	12.543	10.347	(V_{DS} 0V, V_{GS} +12V)
019	5.820	6.771	7.558	8.214	8.691	10.555	11.300	12.654	12.646	12.613	12.341	10.469	(V_{DS} 0V, V_{GS} +12V)
034	5.847	5.895	5.829	5.849	5.849	5.830	5.858	5.872	5.868	5.854	5.819	5.815	Reference device

Reference device **Mean value:** **5.85** **Estimated uncertainty:** **± 0.34 % (± 0.02 nC)**

Red values: greater than max limit
Dark red Values: lower than min limits

STRH8N10STF3	*Min.*	*Max.*	*Unit*
Applicable limits:	n.d.	n.d.	[nC]

Qgd Gate Drain Charge [nCoulomb] vs ^{60}Co Irradiation Total Dose [rad (Si)]



Data from irradiated devices

Figure 21

4.4.2 Gate Charge Waveforms

The total gate charge was measured according to MIL-STD-750 method 3471 cond.B, using test conditions as specified in Table 4 and the test circuit in Figure 2.

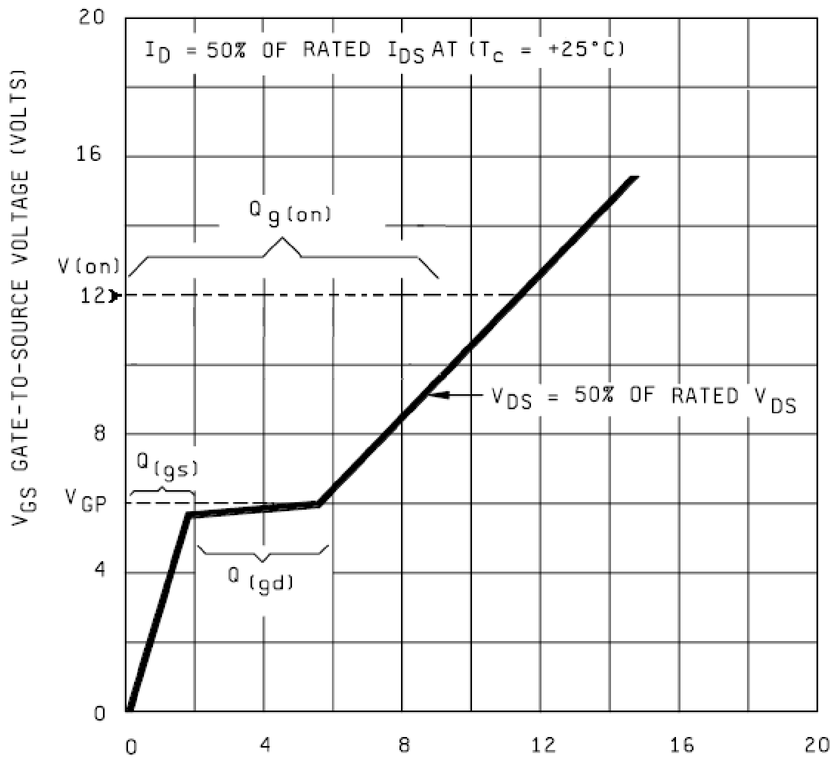


Figure 22 Gate Charge Waveform for N-channel MOSFET (Mil-Std-750E meth.3471) with the identification of Qg, Qgs and Qgd.

Figure 23 to Figure 28 show the measured Gate Voltage Waveforms grouped per bias condition.

For presentation plainness, only the initial and after TID waveform plus the waveform after the annealing and ageing, representative of the group behaviour have been plotted.

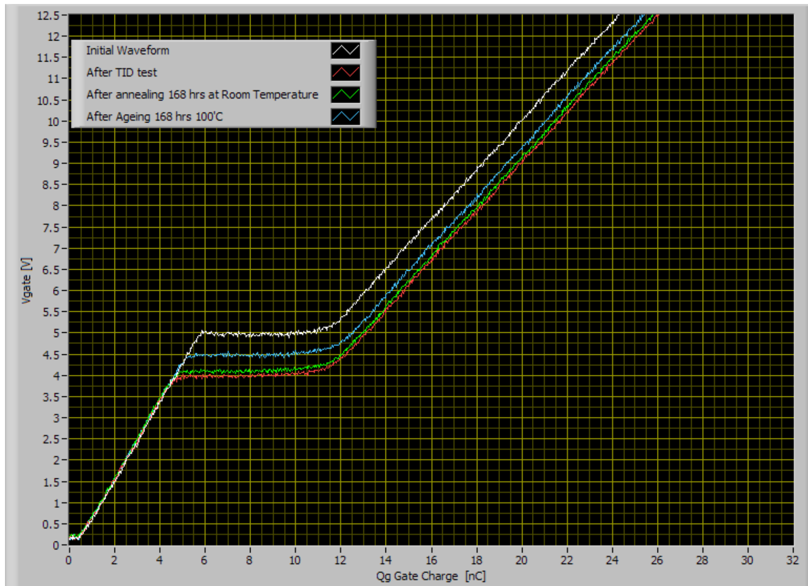


Figure 23

Gate charge waveforms

devices s/n 06 & s/n 07

Bias Conditions:

BC4 V_{GS} = -20V
V_{DS}= +100V

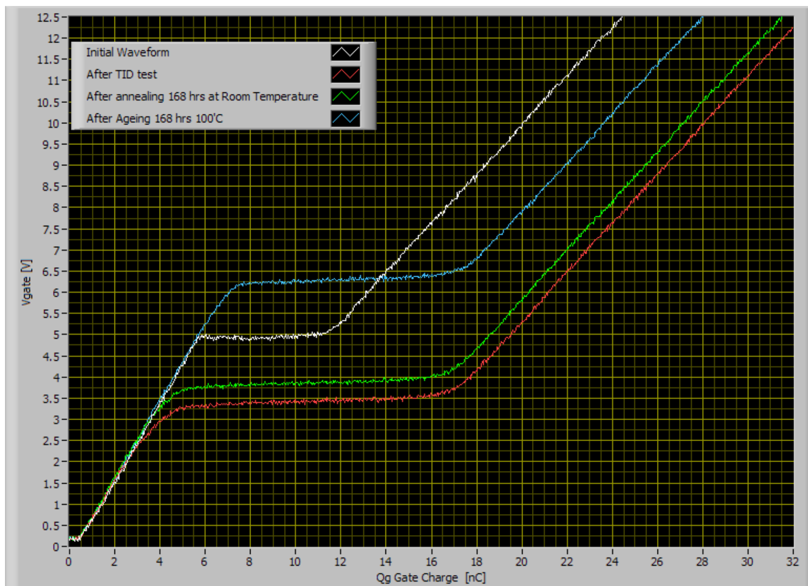


Figure 24

Gate charge waveforms

devices s/n 18 & s/n 19

Bias Conditions:

BC5 V_{GS} = +12V
V_{DS}= 0V

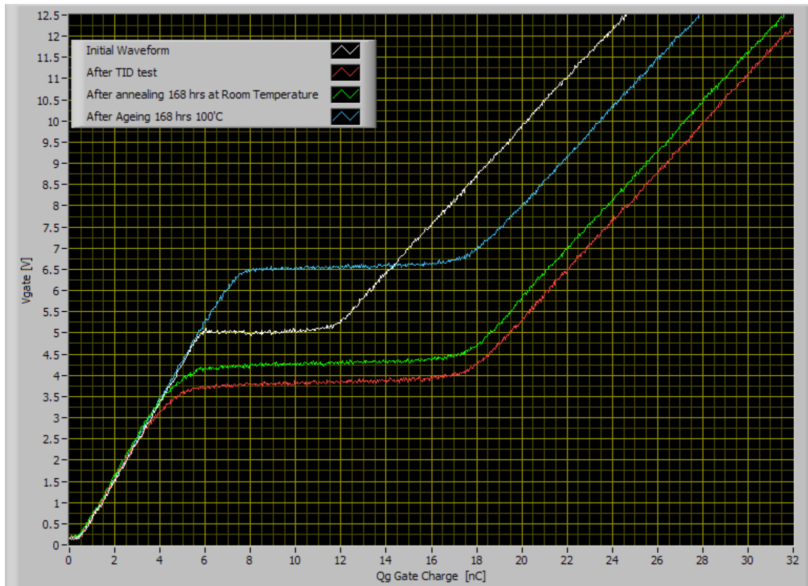


Figure 25

Gate charge waveforms

devices s/n 13 to s/n 17

Bias Conditions:

BC1 V_{GS} =+15V
V_{DS}= 0V

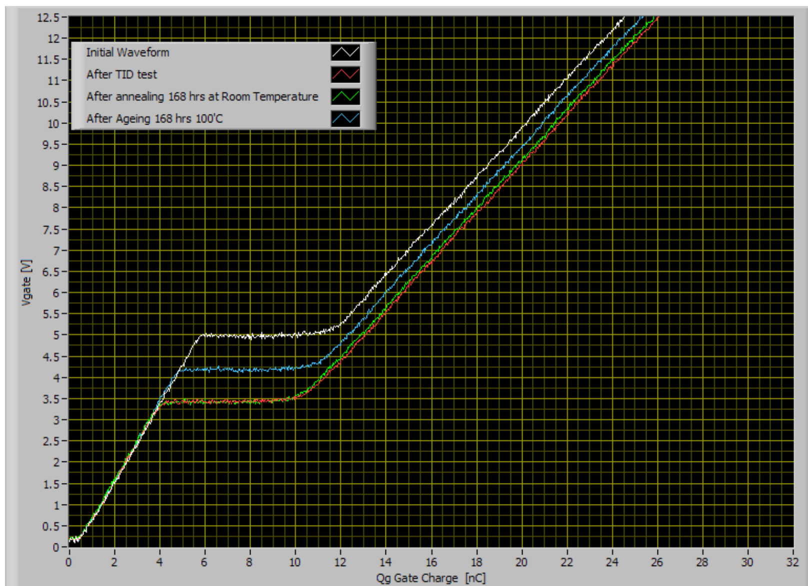


Figure 26

Gate charge waveforms

devices s/n 08 to s/n 12

Bias Conditions:

BC2 V_{GS} = 0V
V_{DS}= +80V

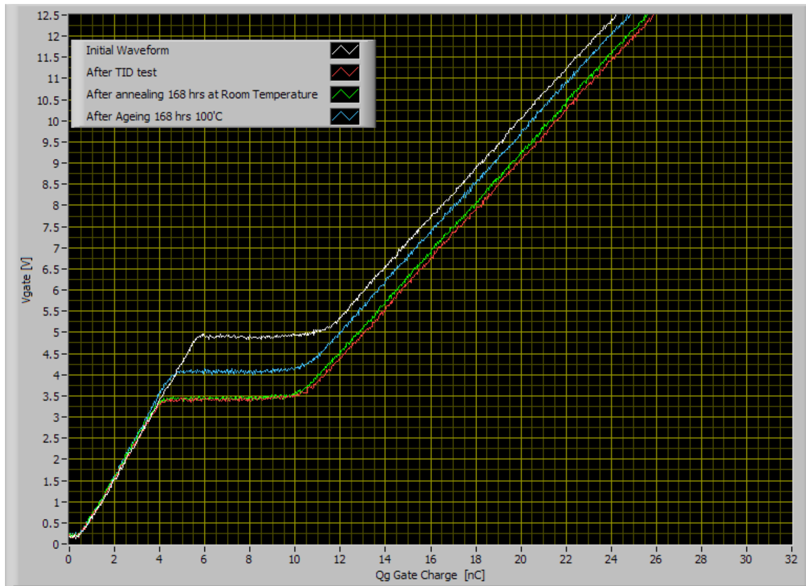


Figure 27

Gate charge waveforms

devices s/n 01 to s/n 05

Bias Conditions:

BC3 V_{GS} =0V
V_{DS}= 0V

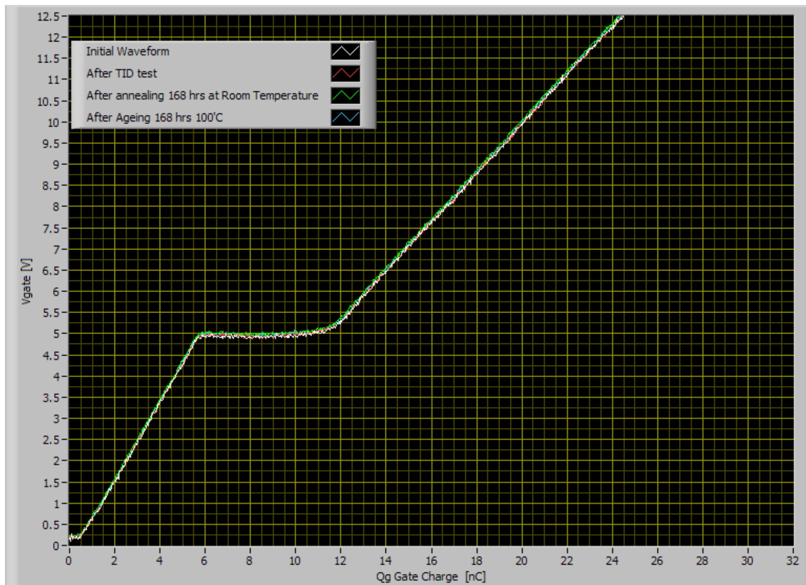


Figure 28

Gate charge waveforms

devices s/n34

Reference device

5 SUMMARY OF TEST RESULTS

No catastrophic failures were observed up to 110.5 krad(Si). The parameter degradations induced by gamma radiation is summarized in Table 25, Table 26 and in Table 27.

Table 25 reports the total doses, recorded before and after the *out of limit* condition, aggregated by the bias condition applied, as described in Table 24:

Table 24 Bias condition descriptions

Bias Condition ID	Description	Irradiated s/n's
BC1	V_{DS} = 0V, V_{GS} = +15V	013, 014, 015, 016, 017
BC2	V_{DS} = +80V, V_{GS} = 0V	008, 009, 010, 011, 012
BC3	V_{DS} = 0V, V_{GS} = 0V	001, 002, 003, 004, 005
BC4	V_{DS} = +100V, V_{GS} = -20V	006, 007
BC5	V_{DS} = 0V, V_{GS} = +12V	018, 019

Table 25 TID levels, in [krad(Si)], before and after out of limit conditions per different BIAS conditions

nr.	Parameter	BC1		BC2		BC3		BC4		BC5	
		pass	*fail*	*pass*	*fail*	*pass*	*fail*	*pass*	*fail*	*pass*	*fail*
(a) 5	VGS_th @ I_D 0.01 mA	55.0	70.1	55.0	70.1	55.0	70.1	110.5	-	**30.1**	55.0
(a) 6	VGS_th @ I_D 0.10 mA	70.1	110.5	70.1	110.5	70.1	110.5	110.5	-	55.0	70.1
(a) 7	VGS_th @ I_D 0.25 mA	70.1	**HTB**	70.1	110.5	70.1	110.5	110.5	-	70.1	**HTB**
(b) 8	VGS_th @ I_D 1.00 mA	110.5	**HTB**	110.5	-	110.5	-	110.5	-	70.1	**HTB**
(a) 9	RDS(on) - D-S On-Resistance	*limits not defined*									
(a) 16	Q_G Total Gate Charge										
(a) 17	Q_{GS} Gate – Source Charge										
(a) 18	Q_{GD} Gate – Drain Charge										

(a) Parameter not listed in Manufacturer Test Condition Log HGOC.tst, dated 09.09.2009
(b) ***HTB****: High Temperature Bias – failing after ageing at high temperature* ***(rebound)***

Note that Table 25 and Table 26 list only the parameters showing an "out of limit" condition (or not defined limits). Refer to Table 27 for a description of the behaviour of all parameters.

Table 26 Detail of Failures

nr.	Parameter	Bias conditions	Remarks	Table	Fig.
(a) 5	VGS_th @ I_D 0.01 mA	**BC5**	S/n's 018 and 019 pass at 30.1 krad(Si). Failures recovered after 168 hrs H.T. ageing.	10	8
		BC1, BC2, BC3	S/n's 013 to 017, 008 to 012 and 001 to 005 pass at 55.0 krad(Si). Failures recovered after 168 hrs H.T. ageing.		

(a) Parameter not listed in Manufacturer Test Condition Log HGOC.tst, dated 09.09.2009

Table 26 Detail of Failures **<< continued >>**

<table>
<tr><th>nr.</th><th>Parameter</th><th>Bias conditions</th><th>Remarks</th><th>Table</th><th>Fig.</th></tr>
<tr><td rowspan="3">(a) 6</td><td rowspan="3">VGS_th @ I_D 0.10 mA</td><td>BC1</td><td>S/n’s 013 to 017 pass at 70.1 krad(Si).
Failures recovered after 168 hrs R.T. annealing.
S/n’s 013 to 017 show evidence of rebound.</td><td rowspan="3">11</td><td rowspan="3">9</td></tr>
<tr><td>BC2, BC3</td><td>S/n’s 001 to 005 and 008 to 012 pass at 70.1 krad(Si).
Failures recovered after 168 hrs H.T. ageing.</td></tr>
<tr><td>BC5</td><td>S/n’s 018 pass at 70.1 krad(Si).
S/n’s 019 pass at 55.0 krad(Si).
Failures recovered after 168 hrs H.T. ageing, showing evidence of rebound.</td></tr>
<tr><td rowspan="4">(a) 7</td><td rowspan="4">VGS_th @ I_D 0.25 mA</td><td>BC1</td><td>S/n’s 015 and 017 pass at 70.1 krad(Si).
Failures recovered after 21 hrs R.T. annealing.
After 168 hrs H.T. ageing, s/n’s 013 to 016 failed (rebound) and s/n 017 show strong evidence of rebound.</td><td rowspan="4">12</td><td rowspan="4">10</td></tr>
<tr><td>BC2</td><td>S/n’s 009 to 012 pass at 70.1 krad(Si).
S/n 008 failed after 168 hrs R.T. annealing.
Failures recovered after 168 hrs H.T. ageing.</td></tr>
<tr><td>BC3</td><td>S/n’s 001 to 005 pass at 70.1 krad(Si).
S/n’s 001 and 002 recovered after 6 hrs R.T. ageing
S/n’s 004 and 005 recovered after 21 hrs R.T. ageing
S/n 003 recovered after 168 hrs H.T. ageing.</td></tr>
<tr><td>BC5</td><td>S/n’s 018 and 019 pass at 70.1 krad(Si).
Failures recovered after 168 hrs R.T. annealing.
After 168 hrs H.T. ageing, s/n’s 018 failed (rebound) and s/n 019 show strong evidence of rebound.</td></tr>
<tr><td rowspan="2">8</td><td rowspan="2">VGS_th @ I_D 1.00 mA</td><td>BC1</td><td>S/n’s 013 to 019 pass at 110.5 krad(Si).
S/n’s 013 to 019 fail after 168 hrs H.T. ageing (rebound).</td><td rowspan="2">13</td><td rowspan="2">11</td></tr>
<tr><td>BC5</td><td>S/n’s 018 pass at 70.1 krad(Si).
S/n 018 recovered after 21 hrs R.T. annealing.
S/n’s 018 and 019 fail after 168 hrs H.T. ageing (rebound).</td></tr>
</table>

(a) Parameter not listed in Manufacturer Test Condition Log HGOC.tst, dated 09.09.2009

The observations indicate the Gate Threshold Voltage V_{GSTH} @ 0.01mA and Q_{GD} Gate – Drain Charge most affected by the TID degradation with worst case drifts down to – 70%(V_{GSTH}) and up to +120% (Q_{GD}) with respect to the initial values.

The Gate Threshold Voltage V_{GSTH} @ 1 mA can still be considered a representative parameter for degradation induced by TID since also exhibits the inversion of degradation trend (rebound effect) after H.T. ageing for the bias conditions BC1 and BC5 (V_{DS}=0V and V_{GS} = +15V V_{GS}=+12V respectively).

In Table 28 and Figure 29 are shown the normalized Gate Threshold Voltage Drift in [%] vs TID and anneal/ageing sequence.

Table 27 Summary of TID test results up to 110.5krad(Si)

nr.	Parameter	Remarks	Worst Case Bias Condition	Table	Fig.
0	IGSS_F1	No evidence of TID dependence. No evidence of Bias condition dependence. All devices still within the limits.	n/a	5	3
1	IGSS_R1	No evidence of TID dependence. No evidence of Bias condition dependence. All devices still within the limits.	n/a	6	4
(a)(d) 2	IDSS @ Vds 5V, Vgs 0V	Evidence of TID dependence. Evidence of Bias condition dependence. All devices still within the limits.	V_{DS}= 0V V_{GS}= +12/15V	7	5
(a) 3	IDSS @ Vds 80V, Vgs 0V	Evidence of TID dependence. Evidence of Bias condition dependence. All devices still within the limits.	V_{DS}= 0V V_{GS}= +12/15V	8	6
(b)4	IDSS @ Vds 100V, Vgs 0V	Evidence of TID dependence. Evidence of Bias condition dependence. All devices still within the limits.	V_{DS}= 0V V_{GS}= +12V	9	7
(a)(d) 5	VGS_th @ I_D 0.01 mA	Clear TID dependence. Clear Bias condition dependence.	V_{DS}= 0V V_{GS}= +12	10	8
(a)(d) 6	VGS_th @ I_D 0.10 mA	Clear TID dependence. Clear Bias condition dependence.	V_{DS}= 0V V_{GS}= +12	11	9
7	VGS_th @ I_D 0.25 mA	Clear TID dependence. Clear Bias condition dependence.	V_{DS}= 0V V_{GS}= +12	12	10
8	VGS_th @ I_D 1.00 mA	Clear TID dependence. Clear Bias condition dependence.	V_{DS}= 0V V_{GS}= +12	13	11
(a)(d) 9	RDS(on) - D-S On-Resistance	No evidence TID dependence. No evidence of Bias condition dependence.	n/a	14	12
(c) 10	VDS(on) - D-S On-Voltage	No evidence TID dependence. No evidence of Bias condition dependence.	n/a	15	13
(a) 11	V(BR)DSS @I_D=100uA	Evidence of TID dependence. Clear Bias condition dependence. All devices still within the limits.	V_{DS}= 0V V_{GS}= +12/15V	16	14
12	V(BR)DSS @I_D=250uA	Evidence of TID dependence. Clear Bias condition dependence. All devices still within the limits	V_{DS}= 0V V_{GS}= +12/15V	17	15
13	V(BR)DSS @I_D=1mA	Evidence of TID dependence. Clear Bias condition dependence. All devices still within the limits.	V_{DS}= 0V V_{GS}= +12/15V	18	16
(a) 14	VSD - Inverse Diode Fwd. Volt.	No evidence TID dependence. No evidence of Bias condition dependence.	n/a	19	17
(a) 15	ID(on) - On-State Drain Current	No evidence TID dependence. No evidence of Bias condition dependence.	n/a	20	18
(a) (d) 16	Q_G Total Gate Charge	Clear Evidence of TID dependence. Clear Evidence of Bias condition dependence.	V_{DS}= 0V V_{GS}= +12/15V	21	19
(a) (d) 17	Q_{GS} Gate – Source Charge	Clear TID dependence. Clear Bias condition dependence.	V_{DS}= 0V V_{GS}= +12/15V	22	20
(a) (d) 18	Q_{GD} Gate – Drain Charge	Clear TID dependence. Clear Bias condition dependence.	V_{DS}= 0V V_{GS}= +12/15V	23	21

(a) Parameter not listed in Manufacturer Test Condition Log HGOC.tst, dated 09.09.2009.
(b) Maximum limit of 10µA instead of 1 mA has been adopted to enhance ATE accuracy for the parameter measurement.
(c) The actual test conditions deviate from Manufacturer Test Condition Log HGOC.tst, dated 09.09.2009 due to test equipment limitation.
(d) Test conditions and Min-Max limits not defined in Manufacturer Test Condition Log HGOC.tst, dated 09.09.2009

Table 28 – V_{GS_th} @ I_{DS} 1.0 mA, Gate Threshold Voltage Drift from initial values [%] vs ^{60}Co Irradiation Total Dose [rad (Si)]

a) Bias Condition BC5 (V_{DS} 0V, V_{GS} +12V), detailed results - V_{GS_th} @ IDS 1.0 mA drift from Initial values in [%]

s/n	0	6'197	15'000	22'500	30'062	55'000	70'067	110'500	Annealing 6hrs RT	Annealing 21hrs RT	Annealing 139hrs RT	Ageing 168hrs 100'C
018	0.00%	-5.64%	-12.88%	-18.18%	-22.07%	-32.11%	-38.24%	-48.01%	-47.86%	-45.24%	-38.69%	23.49%
019	0.00%	-5.69%	-13.05%	-18.61%	-22.78%	-33.28%	-39.74%	-50.78%	-50.14%	-47.30%	-40.84%	19.67%
Avg	*0.00%*	*-5.67%*	*-12.96%*	*-18.39%*	*-22.43%*	*-32.70%*	*-38.99%*	*-49.39%*	*-49.00%*	*-46.27%*	*-39.77%*	*21.58%*
St.dev	*0.00%*	*0.03%*	*0.12%*	*0.31%*	*0.50%*	*0.83%*	*1.06%*	*1.95%*	*1.61%*	*1.45%*	*1.52%*	*2.70%*

b) Bias Condition BC1 (V_{DS} 0V, V_{GS} +15V), detailed results - V_{GS_th} @ IDS 1.0 mA drift from Initial values in [%]

s/n	0	6'197	15'000	22'500	30'062	55'000	70'067	110'500	Annealing 6hrs RT	Annealing 21hrs RT	Annealing 139hrs RT	Ageing 168hrs 100'C
013	0.00%	-4.59%	-10.62%	-15.37%	-18.58%	-27.37%	-32.27%	-40.31%	-40.63%	-37.96%	-32.02%	24.21%
014	0.00%	-4.55%	-10.83%	-15.79%	-19.04%	-27.84%	-32.82%	-41.31%	-40.91%	-38.64%	-32.52%	24.25%
015	0.00%	-4.87%	-11.26%	-16.32%	-19.73%	-28.68%	-33.96%	-42.51%	-42.50%	-39.92%	-33.46%	24.16%
016	0.00%	-4.72%	-10.91%	-15.88%	-19.08%	-27.64%	-32.66%	-41.03%	-40.80%	-38.36%	-31.88%	24.48%
017	0.00%	-4.89%	-11.43%	-16.57%	-20.04%	-29.36%	-34.68%	-43.77%	-43.33%	-40.94%	-34.39%	21.54%
Min	*0.00%*	*-4.89%*	*-11.43%*	*-16.57%*	*-20.04%*	*-29.36%*	*-34.68%*	*-43.77%*	*-43.33%*	*-40.94%*	*-34.39%*	*21.54%*
Max	*0.00%*	*-4.55%*	*-10.62%*	*-15.37%*	*-18.58%*	*-27.37%*	*-32.27%*	*-40.31%*	*-40.63%*	*-37.96%*	*-31.88%*	*24.48%*
Avg	*0.00%*	*-4.73%*	*-11.01%*	*-15.99%*	*-19.29%*	*-28.18%*	*-33.28%*	*-41.79%*	*-41.63%*	*-39.16%*	*-32.85%*	*23.73%*
St.dev	*0.00%*	*0.16%*	*0.33%*	*0.47%*	*0.59%*	*0.82%*	*1.00%*	*1.36%*	*1.21%*	*1.24%*	*1.06%*	*1.23%*

c) Bias Condition BC2 (V_{DS} +80V, V_{GS} 0V), detailed results - V_{GS_th} @ IDS 1.0 mA drift from Initial values in [%]

s/n	0	6'197	15'000	22'500	30'062	55'000	70'067	110'500	Annealing 6hrs RT	Annealing 21hrs RT	Annealing 139hrs RT	Ageing 168hrs 100'C
008	0.00%	-3.81%	-9.58%	-14.70%	-18.45%	-29.52%	-35.00%	-45.11%	-44.69%	-44.88%	-45.43%	-21.11%
009	0.00%	-3.96%	-9.41%	-14.73%	-18.58%	-29.60%	-35.23%	-44.96%	-44.98%	-45.02%	-45.39%	-21.82%
010	0.00%	-4.03%	-9.62%	-14.92%	-18.85%	-29.56%	-35.33%	-45.18%	-44.97%	-45.07%	-45.27%	-22.31%
011	0.00%	-3.89%	-9.78%	-14.87%	-18.71%	-29.49%	-35.27%	-45.11%	-45.02%	-45.01%	-45.41%	-22.59%
012	0.00%	-4.06%	-9.70%	-14.87%	-18.85%	-29.63%	-35.31%	-44.97%	-44.87%	-45.17%	-45.60%	-22.78%
Min	*0.00%*	*-4.06%*	*-9.78%*	*-14.92%*	*-18.85%*	*-29.63%*	*-35.33%*	*-45.18%*	*-45.02%*	*-45.17%*	*-45.60%*	*-22.78%*
Max	*0.00%*	*-3.81%*	*-9.41%*	*-14.70%*	*-18.45%*	*-29.49%*	*-35.00%*	*-44.96%*	*-44.69%*	*-44.88%*	*-45.27%*	*-21.11%*
Avg	*0.00%*	*-3.95%*	*-9.62%*	*-14.82%*	*-18.69%*	*-29.56%*	*-35.23%*	*-45.07%*	*-44.91%*	*-45.03%*	*-45.42%*	*-22.12%*
St.dev	*0.00%*	*0.10%*	*0.14%*	*0.10%*	*0.18%*	*0.06%*	*0.13%*	*0.10%*	*0.13%*	*0.11%*	*0.12%*	*0.67%*

Table 28 – V_{GS_th} @ I_{DS} 1.0 mA, Gate Threshold Voltage Drift from initial values [%] vs ^{60}Co Irradiation Total Dose [rad (Si)] –< Continued >–

d) Bias Condition BC3 (V_{DS} 0V, V_{GS} 0V), detailed results - V_{GS_th} @ IDS 1.0 mA drift from Initial values in [%]

s/n	0	6'197	15'000	22'500	30'062	55'000	70'067	110'500	Annealing 6hrs RT	Annealing 21hrs RT	Annealing 139hrs RT	Ageing 168hrs 100'C
001	0.00%	-4.60%	-10.07%	-15.21%	-18.09%	-29.24%	-34.73%	-44.35%	-43.83%	-44.13%	-43.73%	-22.44%
002	0.00%	-4.31%	-10.07%	-15.09%	-18.99%	-29.87%	-35.18%	-44.86%	-44.01%	-44.38%	-44.15%	-22.07%
003	0.00%	-4.09%	-10.06%	-15.04%	-18.92%	-29.69%	-35.19%	-44.76%	-44.10%	-44.46%	-44.13%	-22.24%
004	0.00%	-4.29%	-10.10%	-15.08%	-18.90%	-29.58%	-35.19%	-44.79%	-44.25%	-44.47%	-44.34%	-22.50%
005	0.00%	-4.15%	-9.92%	-14.90%	-18.92%	-29.36%	-34.87%	-44.36%	-43.83%	-44.07%	-43.91%	-22.70%
Min	*0.00%*	*-4.60%*	*-10.10%*	*-15.21%*	*-18.99%*	*-29.87%*	*-35.19%*	*-44.86%*	*-44.25%*	*-44.47%*	*-44.34%*	*-22.70%*
Max	*0.00%*	*-4.09%*	*-9.92%*	*-14.90%*	*-18.09%*	*-29.24%*	*-34.73%*	*-44.35%*	*-43.83%*	*-44.07%*	*-43.73%*	*-22.07%*
Avg	*0.00%*	*-4.29%*	*-10.04%*	*-15.06%*	*-18.77%*	*-29.55%*	*-35.03%*	*-44.63%*	*-44.00%*	*-44.30%*	*-44.06%*	*-22.39%*
St.dev	*0.00%*	*0.20%*	*0.07%*	*0.11%*	*0.38%*	*0.25%*	*0.22%*	*0.25%*	*0.18%*	*0.19%*	*0.24%*	*0.24%*

e) Bias Condition BC4 (V_{DS} +100V, V_{GS} -20V), detailed results - V_{GS_th} @ IDS 1.0 mA drift from Initial values in [%]

s/n	0	6'197	15'000	22'500	30'062	55'000	70'067	110'500	Annealing 6hrs RT	Annealing 21hrs RT	Annealing 139hrs RT	Ageing 168hrs 100'C
006	0.00%	-1.66%	-4.58%	-7.68%	-9.72%	-16.30%	-20.56%	-29.95%	-29.82%	-29.43%	-28.12%	-16.90%
007	0.00%	-1.70%	-4.52%	-7.50%	-9.66%	-16.39%	-20.76%	-29.83%	-30.00%	-29.51%	-27.99%	-16.78%
Avg	*0.00%*	*-1.68%*	*-4.55%*	*-7.59%*	*-9.69%*	*-16.35%*	*-20.66%*	*-29.89%*	*-29.91%*	*-29.47%*	*-28.06%*	*-16.84%*
St.dev	*0.00%*	*0.03%*	*0.04%*	*0.13%*	*0.04%*	*0.06%*	*0.14%*	*0.09%*	*0.13%*	*0.05%*	*0.10%*	*0.08%*

f) Reference device: V_{GS_th} @ IDS 1.0 mA drift from Initial values in [%]

	0	6'197	15'000	22'500	30'062	55'000	70'067	110'500	Annealing 6hrs RT	Annealing 21hrs RT	Annealing 139hrs RT	Ageing 168hrs 100'C
034	*0.00%*	*0.53%*	*0.54%*	*0.08%*	*0.12%*	*0.51%*	*0.08%*	*0.79%*	*0.62%*	*0.61%*	*0.71%*	*0.71%*

VGS_th @ IDS 1.0 mA, Gate Threshold Voltage Drift from initial values [%] vs 60Co Irradiation Total Dose [rad (Si)]

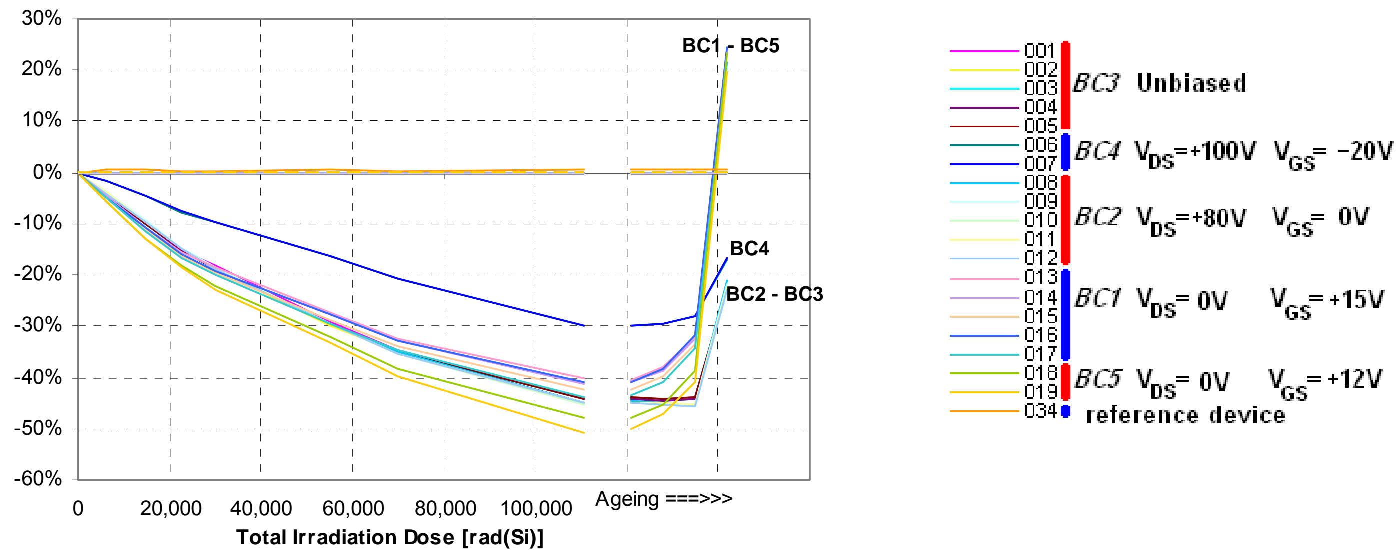


Figure 29

6 CONCLUSIONS

According to test results the conclusion of radiation test on STRH8N10STF3 are summarized as in the following:

- The electrical parameters to be entered in the “Electrical Measurements for Total Dose Radiation Testing” section of the Detail Specification shall at least include:
  - V_{GSth} Gate Treshold Voltage
  - I_{DSS} Drain Current in Off State
  - $V_{BR(DSS)}$ VDS Breakdown Voltage

- The bias conditions specified for TID testing shall include the following condition:
  - V_{DS}=0V, $V_{GS} \geq 12V$ (rated voltage for V_{DSON}).

- Radiation Test Plan for Lot acceptance Test shall include:
  - Low Dose Rate requirement (Window 2 per ESCC 22900)
  - Irradiation according to mission requirement with a minimum of 50Krad(Si).
  - Annealing at R.T. for 168hrs with intermediate electrical measurements after 24hrs.
  - Ageing at 85°C for 168 hrs minimum, with intermediate electrical measurements after 24hrs.
  - Bias condition shall be maintained during the entire test (including annealing/ageing) with duration of the interruption for electrical measurements kept as short as possible (<1hrs).